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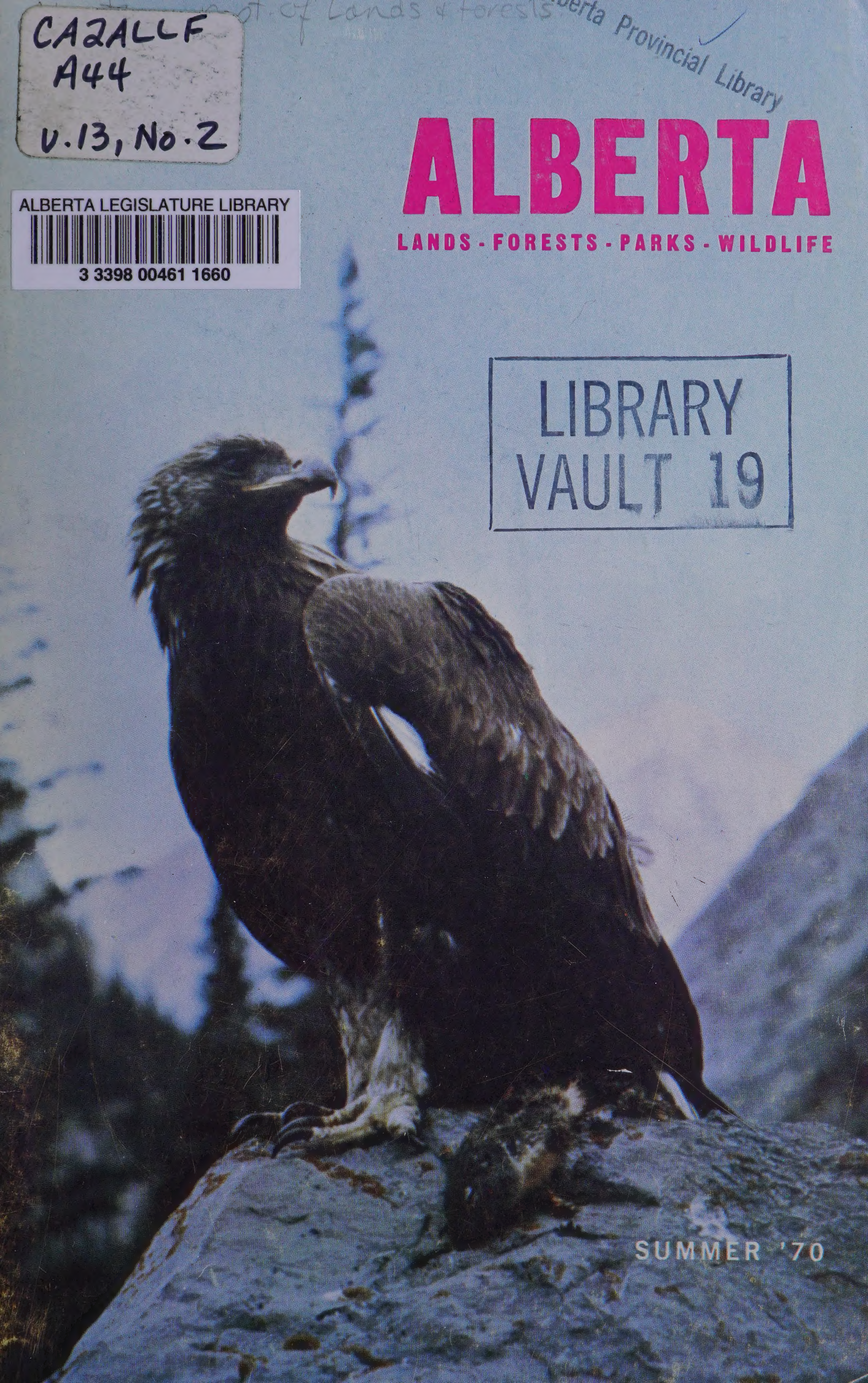

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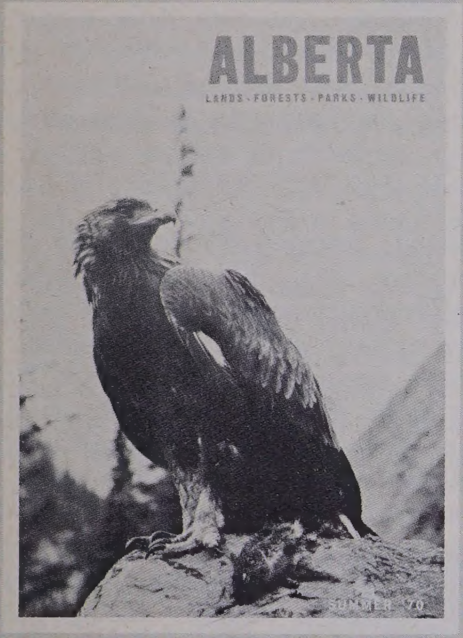

"The golden eagle is a magnificent and picturesque bird whose numbers, like those of certain other species of hawk, are rapidly approaching a dangerously low level. These species are unable to change their predatory nature; therefore, if they are to exist, man must change his. The survival of a predatory species is as important in the mind of the conservationist as is the survival of such game species as the whooping crane and the trumpeter swan." (The Birds of Alberta, Salt-Wilk)

Cover Photo by G. E. Rushton

INSIDE FRONT COVER

Red Lodge Provincial Park on the Little Red Deer River, nine miles west of Bowden. Provincial Parks Photo

ALBERTA

Lands - Forests - Parks - Wildlife

Vol. 13, No. 2 Summer 1970

CONTENTS

Page
A Mercury Problem in Alberta's Game Birds 4
Population, Resources, and Environment of Man 10
Ducks of Alberta (Diving Ducks) 17
Multiple Resource Management Planning 30
New Trophy Fish Records for Alberta 36
Why Environmental Education? 40
Morning Only Goose Hunting 45
Muzzle Loader 47

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A MERCURY PROBLEM IN ALBERTA'S GAME BIRDS

BY WILLIAM WISHART, WILDLIFE RESEARCH BIOLOGIST
DEPARTMENT OF LANDS AND FORESTS, FISH AND WILDLIFE DIVISION
MAY 19, 1970

INTRODUCTION

The following discourse is a brief review of the wildlife-mercury literature and events leading to the discovery of a specific kind of mercury contamination in Alberta's wildlife. Most of the comments will deal with the mercury problem as it pertains to the seed-eating farm game birds of Alberta, namely, the Hungarian partridge and the ring-necked pheasant.

REVIEW

On September 18, 1969 a startled public heard that the fall hunting season on pheasants and Hungarian partridges had been closed in Alberta until further notice due to mercury contamination. The announcement stimulated a series of investigations into mercury contamination of fish, wildlife and other food stuffs throughout many parts of North America.

Although scientists in Sweden have been dealing with mercury problems in wildlife since 1956, the similarities to the Canadian situation did not become apparent until the Canadian Wildlife Service formed a wildlife pesticide research team in 1965 under the direction of J. A. Keith in Ottawa.

Preliminary investigations by the team included a review of the uses of mercury in Canada by a Norwegian biologist, Norvald Fimreite. His report indicated that chlor-alkali industries using mercury cells, and industries using mercury for slime control in Ontario and Quebec accounted for at least 75 per cent of all mercury used in Canada and he predicted mercury contamination in that region. He also pointed out that considerable amounts of organic mercury compounds were widely used in Canada as seed treatment for the control of soil and seed-borne diseases in agricultural crops.

It should be mentioned at this point that the actual amount of mercury added to the environment through seed treatment is relatively small compared to natural and industrial sources.

Organic mercury compounds have varying properties, but probably the most commonly used broad spectrum fungicide for seed-dressing is the highly toxic and stable alkylmercury compound methyl mercury dicyandiamide, marketed as "Panogen". "Panogen" as a liquid mercurial was first developed and used in Sweden in the 1940's and came into common use in Alberta during the 1950's.

In Sweden, conservationists charged that the spreading of the methyl mercury compound caused severe poisoning of seed-eating birds and their predators. In September, 1965 at a scientific conference in Stockholm it was shown beyond any doubt that the use of methyl mercury in agriculture was responsible for the poisoning and drastic decreases of wild bird populations in that country (Lofroth). Alkylmercury compounds were consequently banned in the Scandinavian countries and replaced with less persistent alkoxyalkymercury compounds, and there followed a corresponding decrease in mercury contamination of wild-life (Wanntorp, H. et al.).

Based on the Swedish experience, the Canadian Wildlife Service team proceeded to collect wildlife species throughout Canada that would most likely be contaminated with mercury. Part of the survey in 1968 included seed-eating animals (rodents, upland birds, etc.) and birds of prey in the western prairies. The results of the preliminary survey arrived in late March, 1969 and showed that mercury was being significantly concentrated in prairie seed-eating birds and rodents, and was being transferred to birds of prey to the extent that it was apparently causing hatching failure in their eggs (Fyfe). Additional results from more animals collected in the early summer of 1969 showed average mercury levels in the meat of Hungarian partridges and pheasants of 0.45 parts per million (0.24 p.p.m. to 0.79 p.p.m.) or four and a half times higher than the acceptable level of 0.1 p.p.m. for human consumption of commercial foodstuffs established by the Department of Health and Welfare in Ottawa.

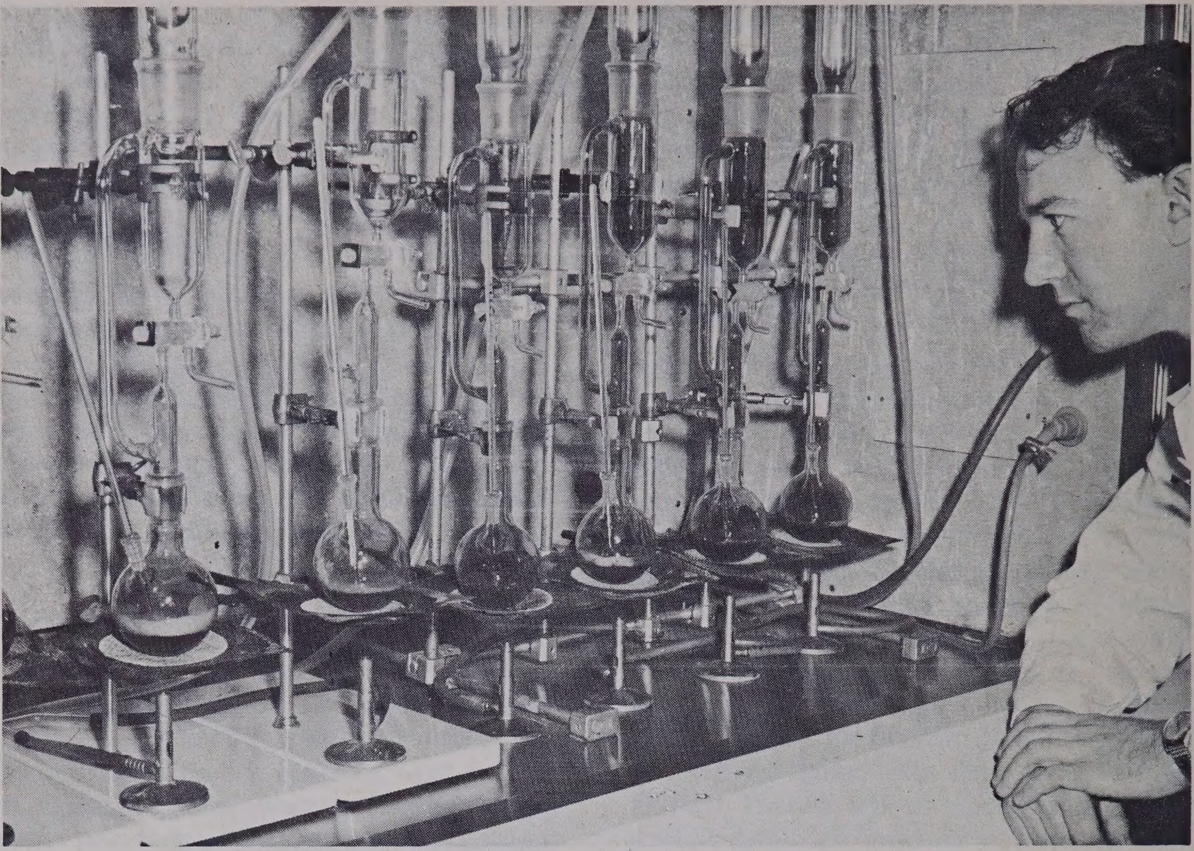
The data was referred to the Alberta Interdepartmental Committee on Pesticides (A.I.C.P.) who in turn recommended to the provincial government that the 1969 hunting season be closed on Hungarian partridges and ring-necked pheasants until the interrelationships of treated seed and wildlife had been reviewed.

FOLLOW-UP INVESTIGATIONS

From the foregoing, two problems clearly emerge; i.e., a public health problem and a wildlife problem. The A.I.C.P. swung into action with an investigation of possible mercury contamination in game birds that would be shot and eaten by hunters in the fall. Consequently, a province-wide collection of 382 upland birds was carried out by Fish and Wild-

ALBERTA GOV'T PHOTO

Inspecting crop contents for pink-colored treated seed prior to tissue analysis for mercury.



ALBERTA GOV'T PHOTO

Dr. J. Roff of the Analytical Services Section, Dept. of Agriculture, noting color changes in solutions from tissue samples, which indicate the amount of mercury present.

life Division personnel during the last week of September in 1969 (Table I, Figure 1). Tissues of the birds were prepared for analysis under the direction of Dr. J. Howell of the Alberta Veterinary Services Branch.

The muscle tissues of 129 birds were analysed by various laboratories and most of the results are available from the Department of Agriculture in a Summary Statement on Pesticides and Mercury in Alberta published February 3; 1970. It is apparent in the report that mercury levels dropped considerably in the fall compared to the early summer situation. Analyses from two laboratories using the very sensitive neutron activation method indicated in the one case that 1 out of 24 fall collected birds exceeded 0.1 p.p.m. and in the other case 3 out of 43 birds were above 0.1 p.p.m. Analysis by a less sensitive chemical method used by the Provincial Analyst indicated 6 out of 67 were at or above the acceptable level of 0.1 p.p.m. (0.10 p.p.m. - 0.36 p.p.m.). In other words, less than 10% of the fall samples were at or above the 0.1 p.p.m. acceptable level compared to 100% above 0.1 p.p.m. in the tissues of the early summer samples.

The attention of wildlife biologists has focused primarily on the time period of high mercury contamination and the resultant effects on wildlife. It appears that the wildlife problem exists in Alberta because mercurial compounds are added to a preferred food for seed-eating animals and distributed in farming areas at a time when other food sources are scarce. Spillage of treated grain during handling, transporting, planting and dumping is probably the major source of mercury contamination (Figure 2).

The crop contents of approximately 300 upland birds have been examined during the four seasons of the year since January, 1969. Treated seeds start to appear in the crop contents of some birds in late winter and the frequency appears to increase from April to June with an abrupt drop in September. The significance of this sequence of events is that the mercury level in some of the pheasants that were collected in late June and early July was high enough to impair their reproduction (Fimreite). As may be expected, a more serious impairment of reproduction has already been found in the falcons that feed on mercury contaminated seed-eaters (Fimreite and Fyfe).

This year the Alberta Fish and Wildlife Division will undertake a large collection of wild upland bird eggs to be analysed and incubated to correlate pesticide levels with hatchability and survival of young.

Meanwhile, the Canadian Wildlife Service will continue on a wider scale to investigate the effects of mercury and other biocides in the environment and monitor their effects on Canadian wild life.

SEED TREATMENT RECOMMENDATIONS

This year for various reasons a marked reduction in the use of methylmercury for seed treatment has taken

TABLE I

Total Upland Birds Collected in September, 1969 for Mercury Analysis

Fish and Wildlife District	Pheasants	Hungarian Partridge	Sharp-Tailed Grouse	Total Birds Collected
Pincher Creek	1	8	5	14
Lethbridge	24	13	0	37
Foremost	8	8		16
High River	15	1	0	16
Cardston	6	0	0	6
Brooks	12	8	0	20
Medicine Hat	14	11	6	31
Strathmore	10	6	0	16
Calgary	0	2	0	2
Drumheller	8	13	10	31
Oyen	0	10	6	16
Olds	4	7	0	11
Red Deer	1	7	0	8
Stettler	2	4	3	9
Rocky Mountain House	0	0	3	3
Provost	0	5	9	14
Camrose	1	9	0	10
Edmonton	1	5	0	6
Evansburg	0	1	2	3
Vegreville	1	4	2	7
Vermilion	0	4	6	10
St. Paul	0	6	13	19
Bonnyville	0	6	9	15
Cold Lake	0	7	6	13
Lac la Biche	0	1	6	7
Athabasca	0	0	4	4
Barrhead	0	3	12	15
Valleyview	0	0	5	5
High Prairie	0	0	7	7
Grande Prairie	0	0	5	5
Peace River	0	0	6	6
	108	149	125	382

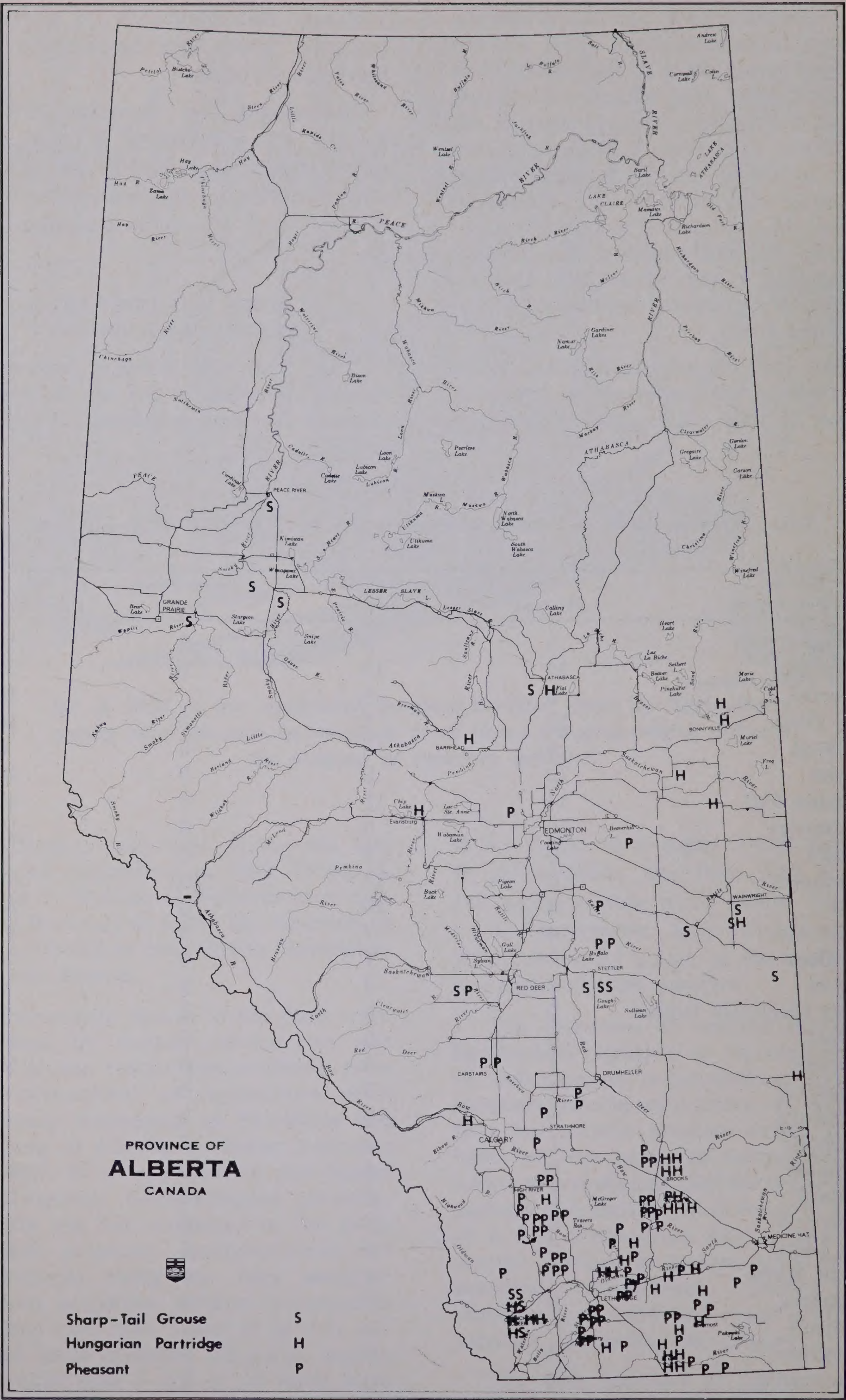


FIGURE 1

Distribution of 129 upland birds collected in September, 1969 that were analysed for mercury.

place in the agricultural community (Gurba). It is the intention of the Department of Agriculture to phase out of alkylmercury seed treatments into new less persistent fungicides. In the meantime, farmers have been asked to observe the following recommendations of Dr. H. Vaartnou of the Alberta Plant Industry Division when handling all seed treatment fungicides.

1. Do not treat more seed than is necessary. If you should underestimate your requirements, use the drill box seed treatment method for the few bushels you are short.
2. Be extremely careful not to spill treated seed around the drill box, grain bins or in any other area. If some seed is accidently spilled, cover it well with soil.
3. Do not leave treated grain on the surface of the soil in the field where birds and animals can pick it up.

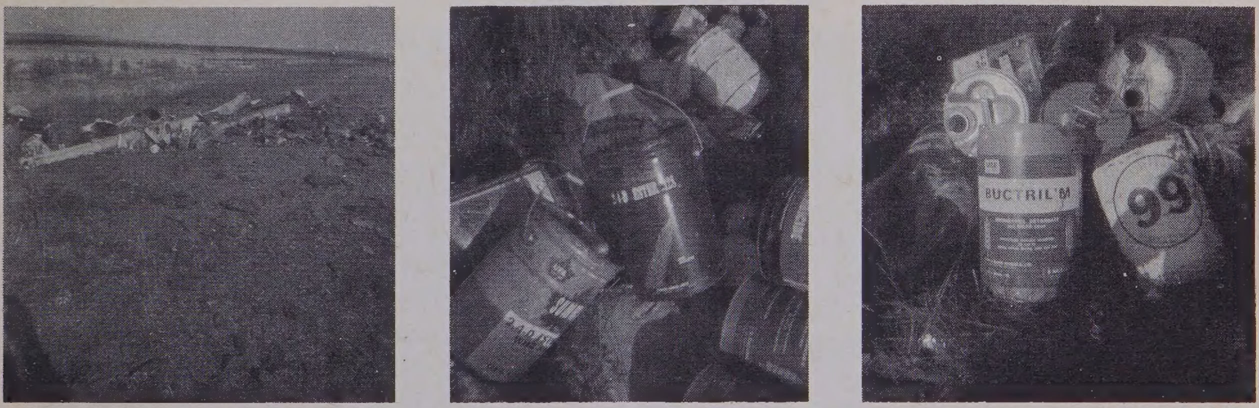
   Cross-seed headlands to ensure that all the seed is covered.
4. If you should have any treated seed left over, either burn or bury it. Also, bury all used seed treatment chemical containers.
5. Never feed treated grain to livestock.

CONCLUSION

We appear to be caught in a race against our own technology. In short, mercury contamination poses the same kinds of problems that we have become familiar with in dealing with other pesticides and with radioactive pollution. Low concentrations of these materials are now widespread on the surface of the earth. Living things can gather and concentrate them in sensitive tissues with results on the life support system and man himself that we must incorporate a greater understanding of natural plant and animal communities into our technology in order to maintain the complex chain of life.

Note:

As of June, 1970, the Food and Drug Directorate in Ottawa has changed the tolerance level for mercury in game birds from 0.1 p.p.m. to 0.5 p.p.m. (i.e. same as fish). The figure 0.5 p.p.m. mercury constitutes a temporary administrative level above which food would not be sold or distributed.



RON SOLE

FIGURE 2 — **Treated grain and chemical containers dumped near slough in southern Alberta.**

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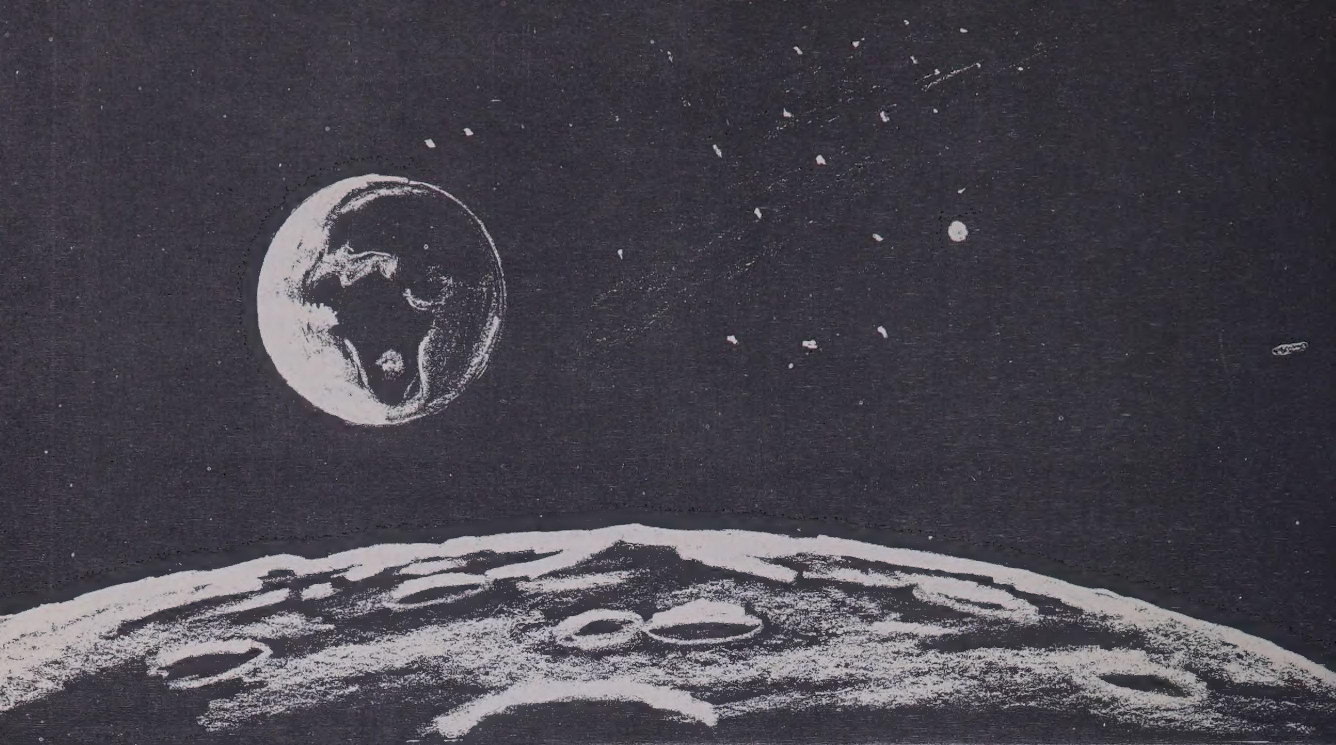


POPULATION, RESOURCES & ENVIRONMENT OF MAN

BY DENNIS McDONALD
REGIONAL FISHERY BIOLOGIST, CALGARY, ALBERTA

PART I

The greatest challenges of the latter third of the 20th century will be in men's minds; the challenge to overcome prejudice toward each other, the realization that the carrying capacity of the Earth is finite, the acceptance that the gross national product does not necessarily measure progress, the appreciation that standard of living and quality of life may not be synonymous, and the understanding that man is a part of, not apart from, the natural earth ecosystem. The concept of a steady state must replace the rampant growth concept of recent centuries if man is to survive as a species on this planet. Humanity must exhibit a greater adaptability in the next three decades than in all of the previous one million years of human history if the problems of overpopulation, pollution, depletion of natural resources and debilitation of the human spirit are to be overcome. As Rene Dubos, a noted scientist and philosopher, points out: "All ecological systems, whether man made or natural, must in the long run achieve a state of equilibrium and be both self-regulating with regard to both energy and materials . . . . We cannot afford to delay much longer the development of a nearly 'closed' system in which materials will retain their value throughout the system, by being recycled instead of discarded." (1)

There is increasing evidence that the resources of the earth are being depleted or destroyed at an alarming rate to satisfy the consumptive appetites of a rapidly expanding world population. As a recent study by Dr. Preston Cloud, Professor of Biogeology at the University of California and Chairman of the National Academy of Sciences Committee on Resources and Man, has pointed out, twelve of twenty recoverable mineral resources of the earth may be exhausted within the lifetime of a Canadian child born today. These resources are tungsten, copper, lead, zinc, tin, gold, silver, platinum, helium, uranium 235, natural gas and crude oil. (2)

An exhaustive study of the earth's resources in relation to man's future needs by the National Academy of Sciences — National Research Council Committee on Resources and Man reached several startling conclusions:

"By average American standards, two-thirds of the world's people are still ill-fed, ill-housed, and ill-clothed, including many in North America." . . . "The quality of life, which we equate with flexibility of choices and freedom of action, is threatened by the demands of an expanding economy and population. This happens in three principal ways: through the restrictive and harmful effects of pollution, through the increasing frequency and complexity of unconstructive but unavoidable human contacts and through the necessary increase of regulatory measures." . . . "Man's own best interests plead for a more generous attitude toward the rest of nature and for less materialistic measures of well-being and success — especially in the developed countries." "Forseeable increases in food supplies over the long term . . . are not likely to exceed about nine times the amount now available. That approaches a limit that seems to place the earth's ultimate carrying capacity at about 30 billion people, at a level of chronic near-starvation for the great majority." (3)

At the present rate of world population increase (the human population is doubling every 35 years), there could be 30 billion people on this planet less than 100 years from today.

This committee and many other concerned scientists have tried to make us realize that we reside on a "space ship" every bit as finite as an Apollo moonship and, like the astronauts, each one of us depends upon the life support systems of our spaceship for survival. Just as Lovell, Sweighert and Haise feared that the air aboard Apollo 13 might be-

D. McDONALD

"The high seas can get that way from garbage." — Cyrus Adler

"The human population of the world has entered a potentially disastrous cycle of growth: we are polluting the environment at an unprecedented rate . . ."
— LaMont C. Cole

come unbreathable, the carbon dioxide content might reach dangerous levels, and the potable water supply might be exhausted, so are the same fears being expressed by scientists about the spaceship on which we travel. Contrary to popular belief, our rivers, lakes and oceans cannot absorb an unlimited amount of waste. The oceans of the world cover three-quarters of the earth's surface and harbor the plankton which produces up to 70% of the oxygen supply of our "spaceship". Recent studies by scientists have shown that "a milligram of DDT per thousand quarts of sea water can reduce by one fourth the ability of algae to produce oxygen." (4) In 1968 alone, over 138,000,000 pounds of DDT were produced and released into the environment by the U.S. chemical industry, at least half of which will still remain in the biosphere in 1983. This single pesticide, about which we know more than perhaps all the hundreds of others put together, has only recently been proven to be harmful to life and it may already be too late to prevent the extinction of peregrine falcons, Bermuda petrels, American bald eagles and brown pelicans due to its use. But so what, who cares about a few species of birds anyway? Remember this, miners used to carry canaries into the mines in cages and if the birds keeled over, they got out before they did the same. Can we be certain that what is happening to a few bird species cannot happen to us?

Consider the fact that recent research by Richard M. Welch, chief biochemical pharmacologist at Burroughs-Wellcome Laboratories, has shown that the sex hormones of rats are broken down by DDT. Rat hormones are chemically similar to human sex hormones. (4)

In an informative article on ocean pollution problems, Cyrus Adler observes that 8% of the shell fishing grounds off the United States have been declared unsafe due to health hazards and that "the Black Sea, some Norwegian Fjords and the deep basins of the adjacent seas have been completely deprived of all oxygen by natural processes; only hydrogen sulfide remains." (5)

And what of the atmosphere — does it have an infinite capacity to absorb wastes? The earth is surrounded by a thin veil of gases held in contact with the planet's surface by the forces of gravity. Because of these same gravitational forces, all pollutants, with the exception of certain forms of energy, cannot escape from the atmosphere unless they return to the earth's surface. Obviously then, smoke, dust, chemicals and other airborne pollutants are never "lost", they re-enter the biosphere eventually, somewhere on our planet. Thus we see atomic bombs exploded in the South Pacific and Eskimos picking up radioactive fallout in the Canadian Arctic, and planes spraying DDT over the jungles of Borneo only to have the poison settle out in Antarctic seas.

Man's knowledge of the workings of the atmosphere is sketchy at best and yet he confidently relies upon the skies above his head to transport the waste products of his civilization to other areas, he cares not where. As with all pollution, out of sight—out of mind is the simplest and most expedient solution to a waste disposal problem. But man can never do merely just one thing. And thus we see the CO_2 content of the earth's atmosphere threatening to double within the next 40 years, if the present rates of combustion of fossil fuels (coal, oil, natural gas) continue to increase at 5% per year. As Paul K. Anderson, Associate Professor of Zoology at the University of Calgary, points out: "Carbon dioxide pollution acts as a blanket around the earth causing it to retain, rather than to radiate, the sun's heat, and the theoretical degree of warming which is expected to result from this carbon dioxide effect would be sufficient to melt the Arctic and the Antarctic ice, causing a rise in sea level of approximately four to five hundred feet, flooding the majority of the world's major cities, eliminating much valuable agricultural land, and crowding the increased mass of human beings into a vastly smaller land area." (6)

". . . the question is, not how many people can exist on earth, but what kind of life will be possible for those who do."

— Paul B. Sears

Primarily because of air pollution, the average North American citizen today carries radioactive isotopes in his thyroid gland and bones, pesticide residues in his body fat and all manner of particulate matter in his lungs. The incidence of respiratory ailments (asthma, emphysema, bronchitis and lung cancer) is increasing at alarming rates in the industrialized nations of the world. Air pollutants are implicated as the principal causative agents of this ailment.

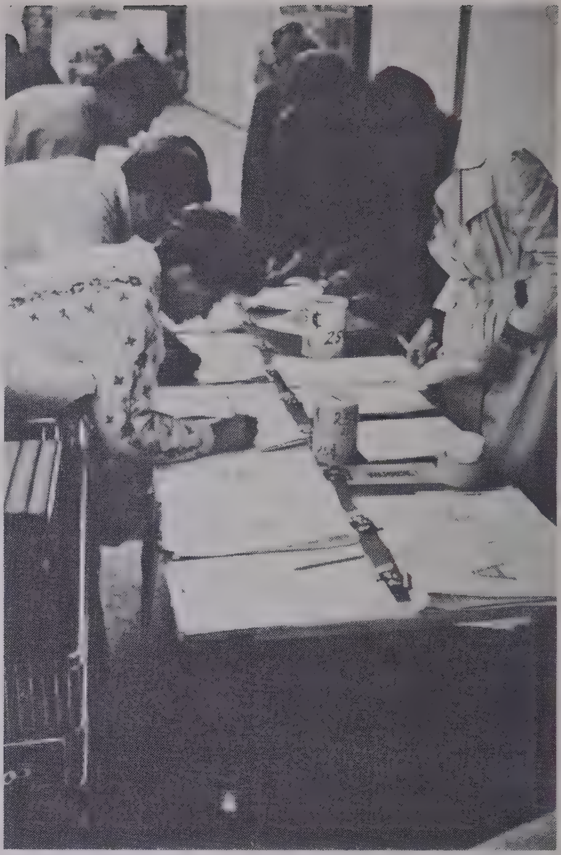
In several of the world's major cities, children are warned not to breathe too deeply while playing outside during periods when the smog is particularly filthy and in some industrialized zones, children are actually required to wear surgical face masks in order to play outside during recess.

According to Rienow, a study done in New York City concluded that a citizen at street level, working outdoors, "took into his lungs the equivalent in toxic materials of 38 cigarettes a day." (7)

The portion of the atmosphere within which most life resides is the stratosphere which extends upward from the earth's surface to a height of seven miles. It is within this zone that most weather patterns develop and most pollutants collect and, in relation to the earth itself, this critical layer is thinner than the skin of an apple. Unless we keep the air in this zone fit for man to breathe, we are in trouble. As the majority of the air pollutants presently result from the burning of fossil fuels, it is imperative that we re-assess our use of these resources in the immediate future. There are additional reasons for doing so. As has been pointed out previously, both the oil and natural gas reserves of our planet may be exhausted within 70 years. Can man afford to continue using them in such a wasteful fashion, burning them, when other energy sources (solar, tidal, hydroelectric, nuclear) might suffice to meet our energy requirements? Apparently not according to the N.A.S. - N.R.C. Committee on Resources and Man: "The fossil fuels are needed for petrochemicals, synthetic polymers and essential liquid fuels for which suitable substitutes are as yet unknown. They might also play a part in synthetic or bacterial food production (although such a use is also limited). They should not be spent in the generation of electricity, for heating, and for industrial purposes where substitutes can qualify." (op. cited)

It is important to realize, at this point, that the depletion of the earth's resources and the pollution of its atmosphere, soil and water is not occurring evenly throughout the globe. The peoples of the industrialized nations, representing less than 20% of the world population, consume more than 85% of all the natural resource production on this planet every year. As Dr. Paul Ehrlich, Professor of Biology at Stanford University, has pointed out, the people of the United States alone use more of the raw materials of the earth every year than all the rest of the world combined. (8) Less than 6% of the world's population lives in the United States and, because they consume a disproportionate share of the world's resources, they produce a disproportionate share of the world's wastes. Unfortunately, they export these wastes via biospheric systems to every land and water area on this planet and so all peoples must pay a price for U.S. affluence.

If the present annual resource production of the earth was used solely to support people at the standard of living of the average American today, our "spaceship" could only accommodate 500 million people. That's 1/7 of all the people alive today and only 1/14 of all the people expected to be aboard this spaceship in the year 2000 A.D. Obviously something has got to give. Either the standard of living of the industrialized minority must drastically decline or the population of the world must be reduced. It has been estimated that the world can sustain one to two billion people at a standard of living almost comparable with that of a Canadian today and still guarantee a reasonable quality of life. Perhaps this is the goal that mankind should strive for. To achieve it, our present numbers must gradually be reduced by over one and one-half billion people.



"Unless society intervenes to defend itself, it may not survive in comfort or even decency."
— John Kenneth Galbraith

Several of the panaceas cherished by humans when confronted with problems of this magnitude are that the oceans of the world will meet mankind's future needs or we will import the resources we need from outer space or we'll ship our surplus population to other planets. Even a brief examination reveals that these proposals are ludicrous. Most of the oceans of the world are biologically unproductive and we are fast polluting the portions that aren't. Sunlight provides the basic energy source upon which most food production depends and sunlight can penetrate only a little way into the vast depths of the oceans. As a result, except for regions such as the Antarctic seas and the Peruvian coast, many nutrient materials are trapped in the abyssal depths of the ocean, perhaps for thousands of years. It is only where upwelling of ocean currents brings these materials to the surface of the seas that appreciable food production occurs. Dr. William E. Ricker of the Fisheries Research Board of Canada estimates that the production of food from the sea in the future is not likely to be more than 2½ times the present annual production of 60 million metric tons. In Ricker's own words, "Some popular writers have pictured the ocean as a limitless reservoir of food energy — one that could support any conceivable human population. Nothing could be farther from the mark." (9) As he further points out, only 3% of the total energy requirements of the expected 7 billion people on the earth by 2000 A.D. can be met from the sea.

But if the oceans cannot meet mankind's future needs for food, can they supply all the mineral resources that he will need? Dr. Preston Cloud comments as follows: "What we must avoid is to succumb to the misleading notion that a great variety of resources are available in large volume, such that when we run out of terrestrial resources we can simply turn to the sea . . .". ". . . if present conceptions of earth structure and of sea-floor composition and history are even approximately correct, minerals from the seabed are not likely to compare in volume or in value with those yet to be taken from the emerged lands. As for seawater itself, despite its large volume and the huge quantities of dissolved salts it contains, it can supply few of the substances considered essential to modern industry." (10)

If our planet cannot possibly support the expected masses of humanity in the future, what solutions lie in the inhospitable vastness of outer space? The answer: probably none. To stabilize the world's population at present levels by exporting people into space would require the launching of 2,000 spaceships, each with 100 people on board, every day of the year (holidays included) for all future time that the rate of increase remains unchecked. Even if our technology was capable of such a feat, which it is not (over $300 million spent on each Apollo mission to the moon and back with only three men on board) and even if our entire solar system was habitable by man, which it is not, all of the other planets would be as densely populated as the earth within 250 years. What then?

D. McDONALD

"Conservation is a state of harmony between man and the land." — Aldo Leopold

The fantasy that the moon and other planets can supply the mineral resources of future generations is similarly incorrect. Resources for the Future, an independent study group of economists, geologists, engineers, and other scientists, expressed the following view after studying the prospects of space mining: "It has been estimated that the costs of transport from the earth to the moon, at such a time when there is some "traffic" between the two, will be several million dollars per ton . . . . Under the most optimistic conditions, the energy alone would probably cost many thousands of dollars per ton transported. There is no crude mineral having a value on earth sufficient to justify such a high transport cost, let alone the cost of discovering it, producing it, and making it available for shipment. There is little prospect that total transportation costs could be decreased to a practical level. And, although there may ultimately be some minerals production on other solar system planets, this would appear to be only for use on those planets rather than for transport to the Earth. Hence, the prospects for augmenting the Earth's mineral supply by transport from space must be considered practically negligible." (11)

The problem is clear. Man exists on a finite "spaceship" that is marvelously equipped to supply his needs for a rich and rewarding life. In his greed to attain material wealth or through his ignorance of his interdependance upon nature, he has plundered the planet he calls home. He has lessened the prospects of "the good life" for the youth of today and generations of those yet unborn in the process. Now is the time that he must make amends.

He must find acceptable ways to stabilize and ultimately reduce his numbers on earth. The process of re-cycling mineral resources must begin immediately and waste must be reduced to an absolute minimum. A new value system must evolve in which beauty replaces banknotes as the standard of measure. Man's vision must expand to encompass the needs of all peoples, regardless of their birthplace, racial origin or present place of residence. Each and every one of the privileged few who live in an affluent nation such as Canada must realize that we exert "50 times more of a burden on the environment" (12) than a person in an "underdeveloped" country. And the underdeveloped countries of which we speak are far from being so as a result. In actual fact, it is the natural resources of these countries which provide much of the base upon which our prosperity is founded.

In summary, each of us must begin to think in a global sense because, as the man said, "we're all in this together!" And as Luna Leopold has pointed out, it will be little satisfaction to enjoy a financially lucrative economy "at the expense of living in an environmental desert." (13)

N.B. In the second of a series of three articles, the writer will examine the population, resources and environment of Canadians in relation to the problems cited in this article.

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(4) R. Armstrong Kennedy. ''The Pesticide Crisis - DDT's Environmental Price Tag'' in **Nature-Science Annual - 1970** Time - Life Books, New York 1969.

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(11) Hans H. Landsberg, Leonard L. Fischman and Joseph L. Fisher. **Resources in America's Future: Patterns of Requirements and Availabilities 1960 - 2000** John Hopkins Press 1963.

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DUCKS of ALBERTA

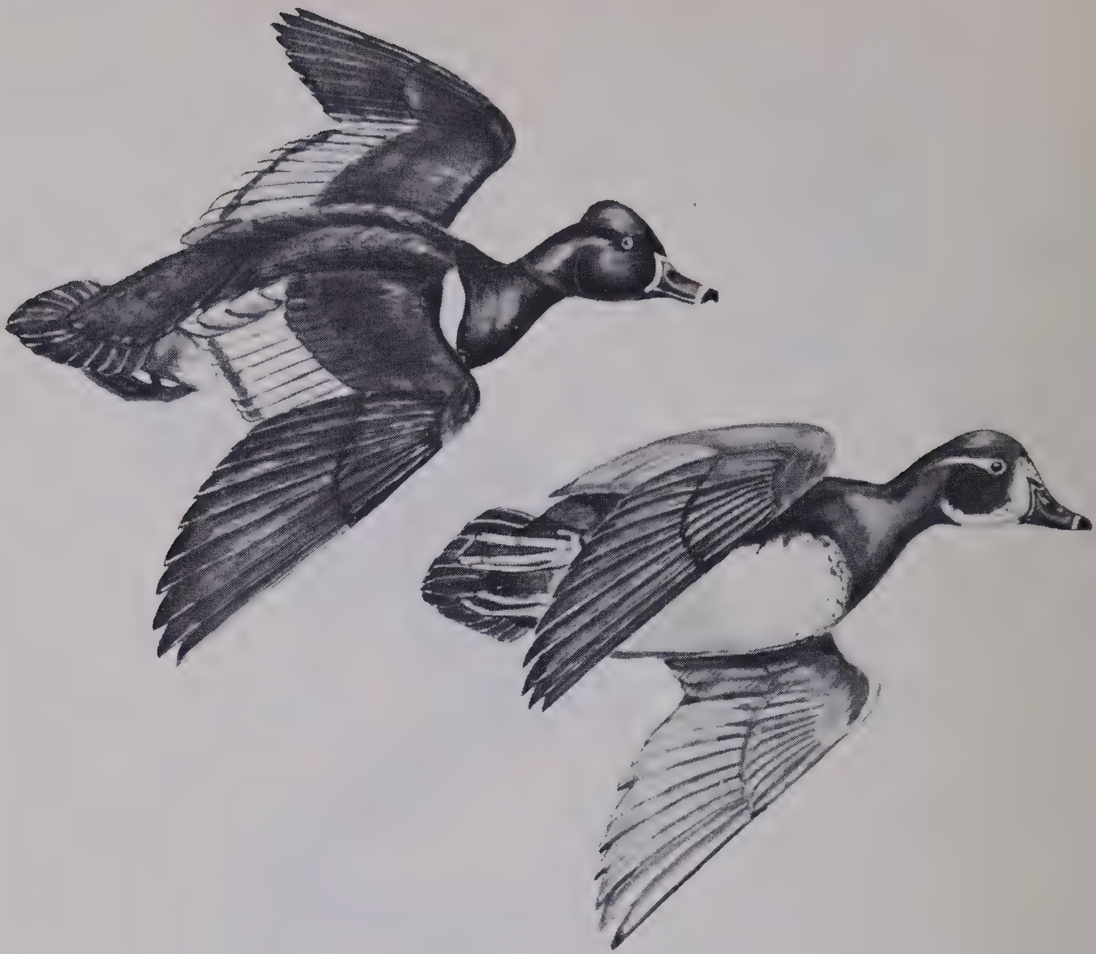
(DIVING DUCKS)

Diving ducks frequent the larger, deeper lakes and rivers, and coastal bays and inlets.

The colored wing patches of these birds lack the brilliance of those of puddle ducks, but are still important field marks on most species. Most diving ducks have short tails, so they sometimes use their huge, paddle feet as rudders in flight. When launching into flight, most of this group patter along the water before becoming airborne.

They feed by diving, often to considerable depths. To escape danger, they can travel great distances underwater, emerging only enough to show their heads or bill tips before submerging again.

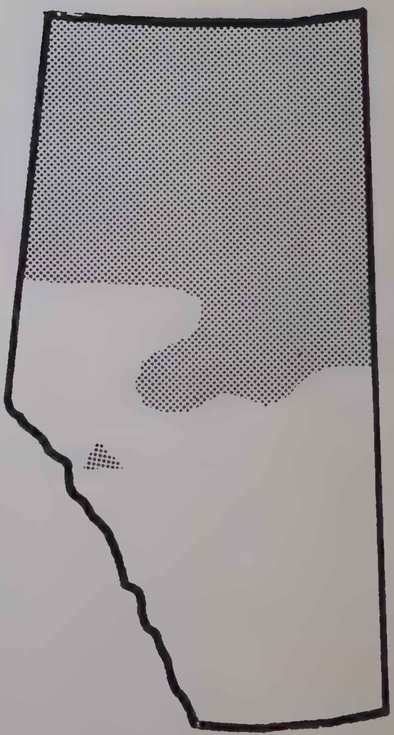
Since their wings are small in proportion to the size and weight of their bodies, their wing-beats are more rapid than those of puddle ducks.



RING-NECKED

Identification

Male: Head and neck black with purplish iridescence. Thin collar of brown around lower neck. Upper parts brownish black, speculum grey. Breast black, with rest of underparts and sides white with some fine dark barring on sides. Beak slaty blue with white base and white band near tip. Female: Upper parts blackish brown, browner on hindneck and upper back, blacker on rump. Speculum grey. Foreneck, throat, and ring around base of beak whitish. Rest of underparts white vaguely marked with brown.



Range

Throughout central and northern Alberta. Winters in southern B.C., western U.S. and Central America.

Nesting

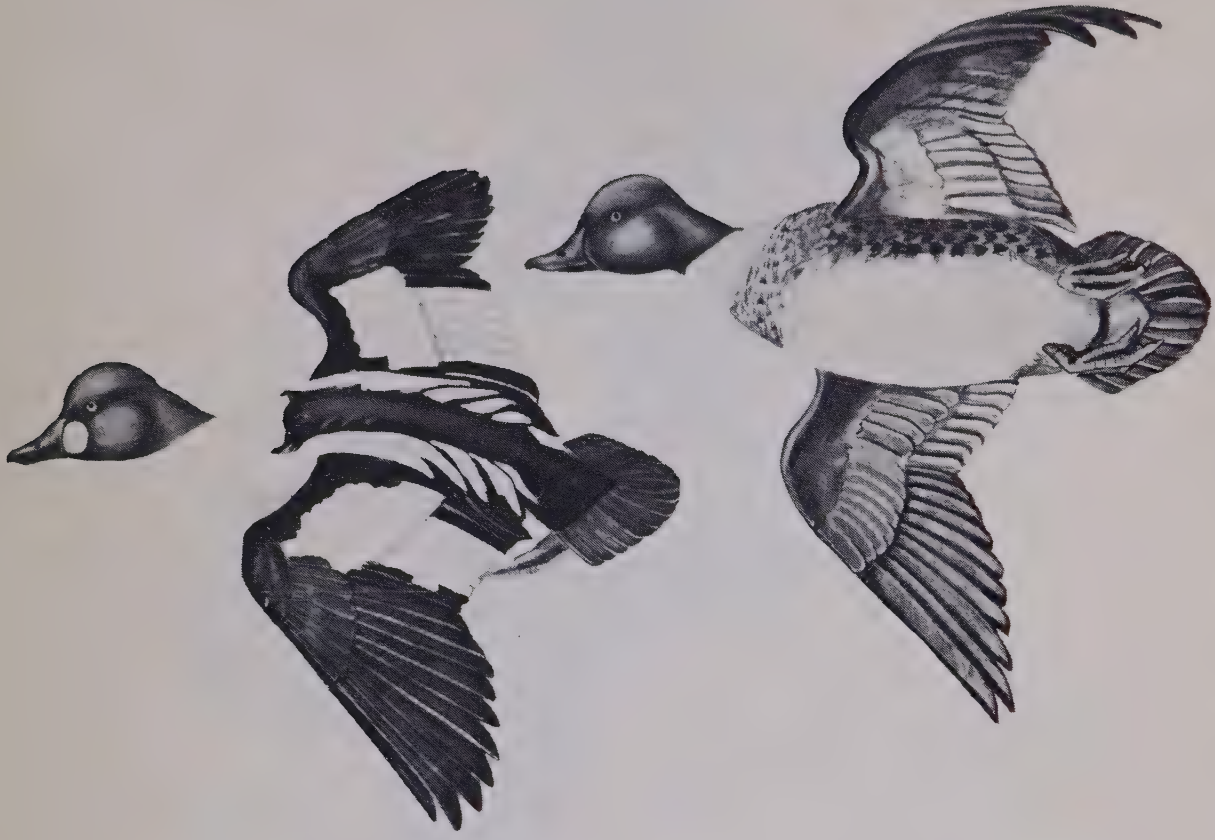
In marsh or edge of sloughs. Nest of grass, reeds, and rushes lined with down. Eggs 6 - 12, olive buff.

Food

Essentially pond weed and various aquatic insects.

Remarks

Up to a dozen in a flock fly in open formation and usually come directly into landing without circling. Hens are easily confused with female redheads. Absence of dark edge on speculum helps distinguish from hen scaup. Drakes purr, hens usually silent.



COMMON GOLDENEYE

Identification

A medium size duck with a short neck and puffy head. Male: Head and upper neck black with green iridescence except a large white spot between beak and eye. Rest of underparts and neck white. Upper parts black with white streaks on scapulars and large white area on wings. Female: Head and neck chocolate brown and rest of underparts greyish black. The wings have much white, mainly on the secondaries.

Range

Generally throughout northern and central Alberta. Winters on coasts and throughout most of U.S.

Nesting

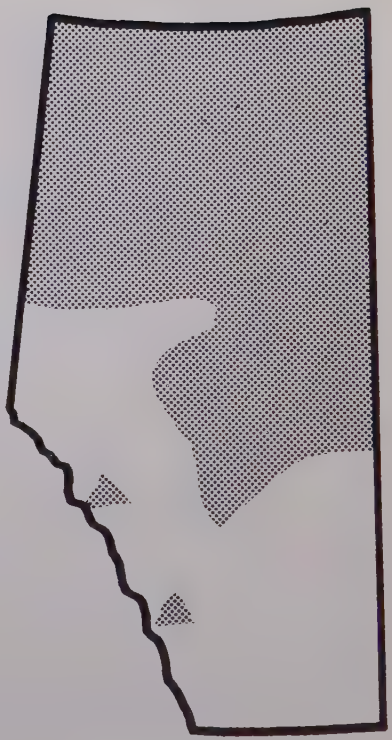
In holes of hollow trees or stumps. The nest is a mass of down and feathers in the bottom of cavity. Eggs 8 - 12, grayish green.

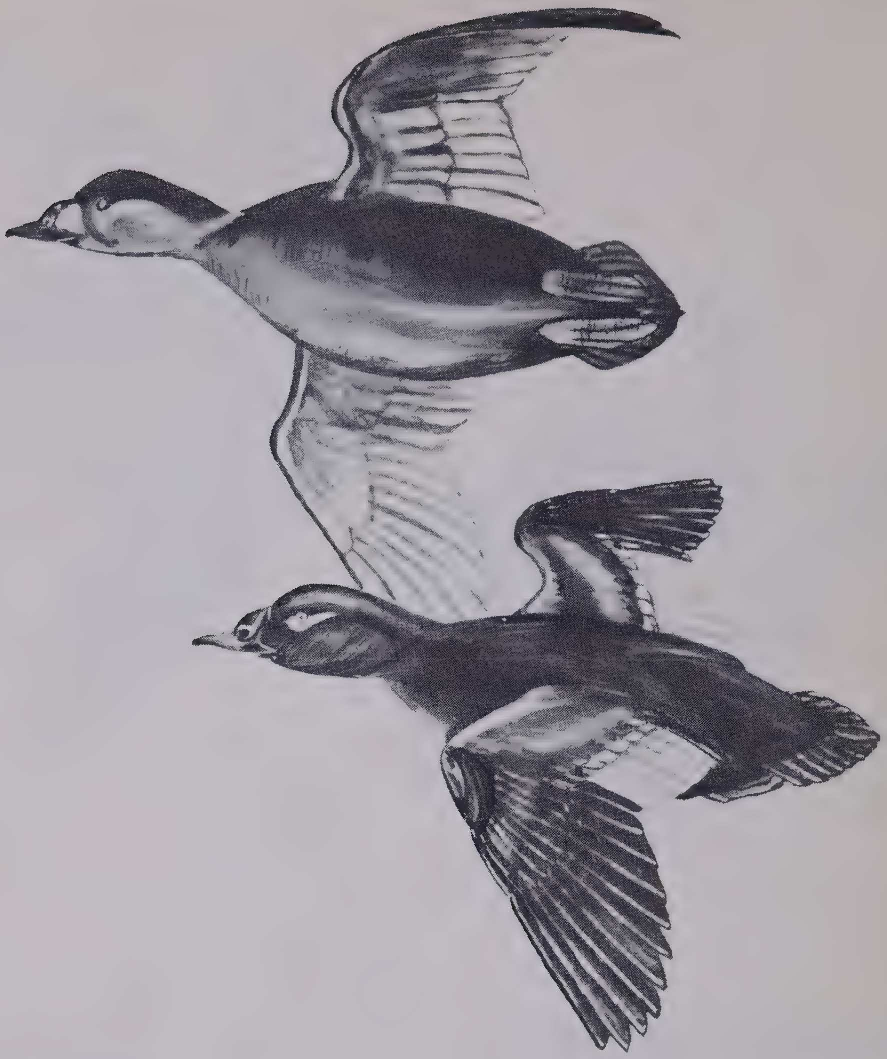
Food

Aquatic insects, snails, shrimp, seeds, tubers.

Remarks

Distinctive wing whistling sound in flight has earned the name of whistler. Active, strong winged fliers, moving in small flocks, often high in the air. Flocks frequently rise in rapid spirals. Exceedingly wary. Drakes purr, hens are usually silent.





WHITE-WINGED SCOTER

Identification

Male: Entirely black, sometimes with brownish tinge and usually paler on underparts. A thin white crescent under the eye. Speculum is white. Black beak with a prominent knob at its base, while the tip is orange. Iris of eye white. Legs dull red. Female: Underparts blackish brown with a faint white mark behind the eye. Speculum white, underparts greyish brown. Beak and legs brownish black. Iris is brown.

Range

Throughout Alberta, with exception of mountain regions. Winters along both Atlantic and Pacific coasts, ranging as far south as California.

Nesting

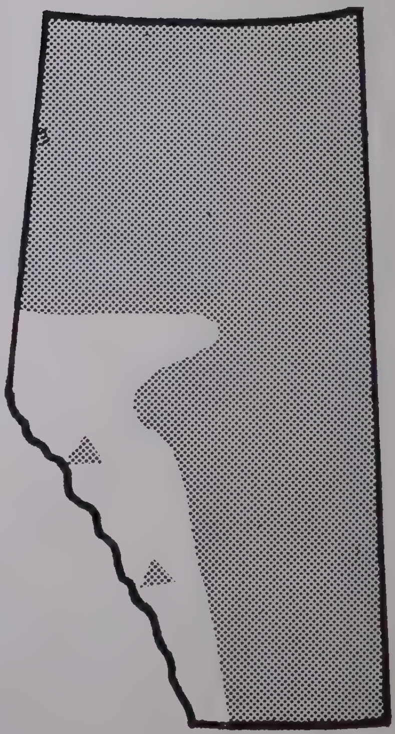
On the ground in light woods or prairies. Nest is a depression in the ground lined with grass and down. Eggs 6 - 10, pinkish buff.

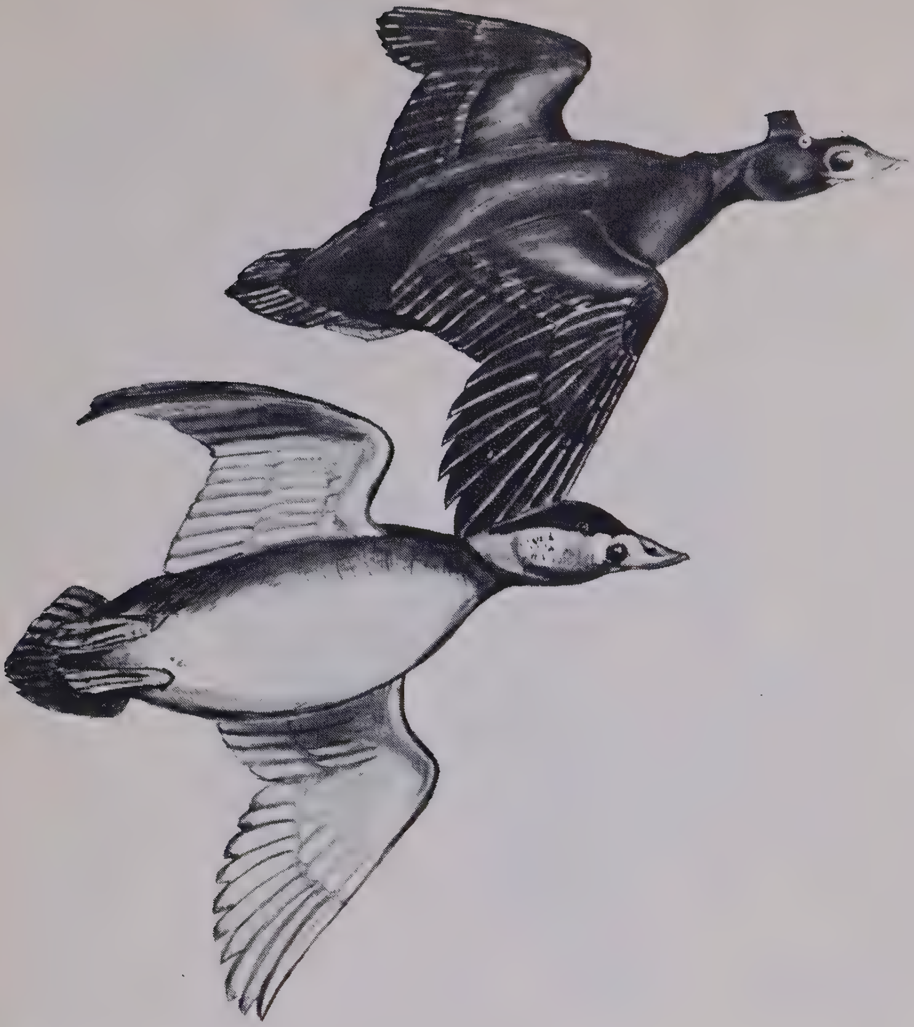
Food

Aquatic insects and most underwater plant life.

Remarks

The scoter is a large slow flying bird, making it a relatively easy target for the hunter, but few are taken because their flesh has a strong fishy flavor.





SURF SCOTER

Identification

Male: A white patch on forehead between eyes and a triangle across nape and pointing down hind neck. Remainder black or brownish black. Iris white, legs orange. Female: Top of head to lower level of eyes black. White patch on ear and another near base of beak. Abdomen mottled light and dark grey. Rest of head, neck and body dusky brown. Beak slaty black. Iris brown. Legs black tinged with yellow.

Range

Fairly common in north-eastern Alberta. Winters on both Pacific and Atlantic seacoasts, as far south as California.

Nesting

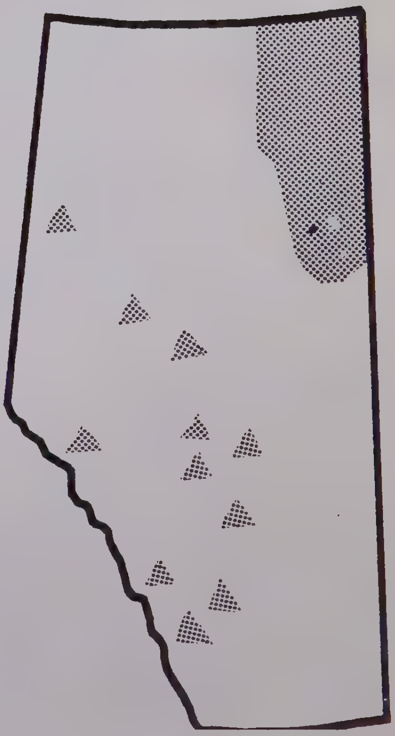
On the ground on islands of lakes. Nest of reeds and grass lined with down. Eggs 5 - 8, cream in color.

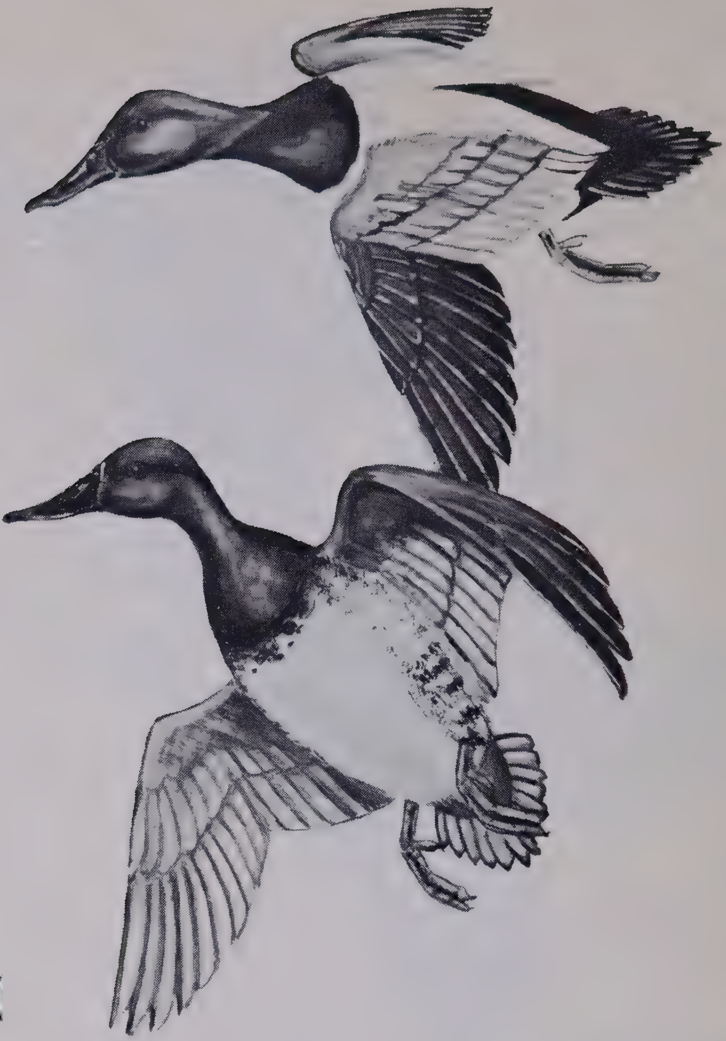
Food

Aquatic plant life, snails and insects.

Remarks

Most nesting occurs in the Athabasca delta area during the months of June and July. There is much bickering and displaying by the males, especially if the sexes are not equally distributed in the group. If disturbed, the surf scoter easily becomes airborn, flying close to the water. The whistle of their wings as they take off can easily be heard for two to three hundred yards.





CANVASBACK

Identification

Male: Head and neck are reddish brown. Lower neck and upper breast black. Rump and tail regions black. Remainder of the back is white, finely barred with thin lines of black, producing a canvas grey effect. Sides and rest of underparts, white. Female: Head, neck and upper breast are brown with a slight tinge of red on head and chest. Back, wings and sides brown, the feathers edged with white producing a brown-grey effect. Rest of underparts greyish white.

Range

Breeds mainly in north-central Alberta, winters in southern U.S. and Mexico.

Nesting

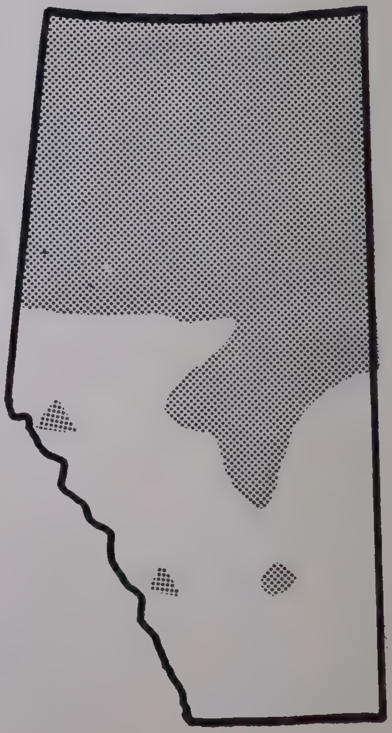
In rushes or reeds over shallow water. Nest a bulky mass of reeds just above the water level. Eggs 7 - 9, pale olive.

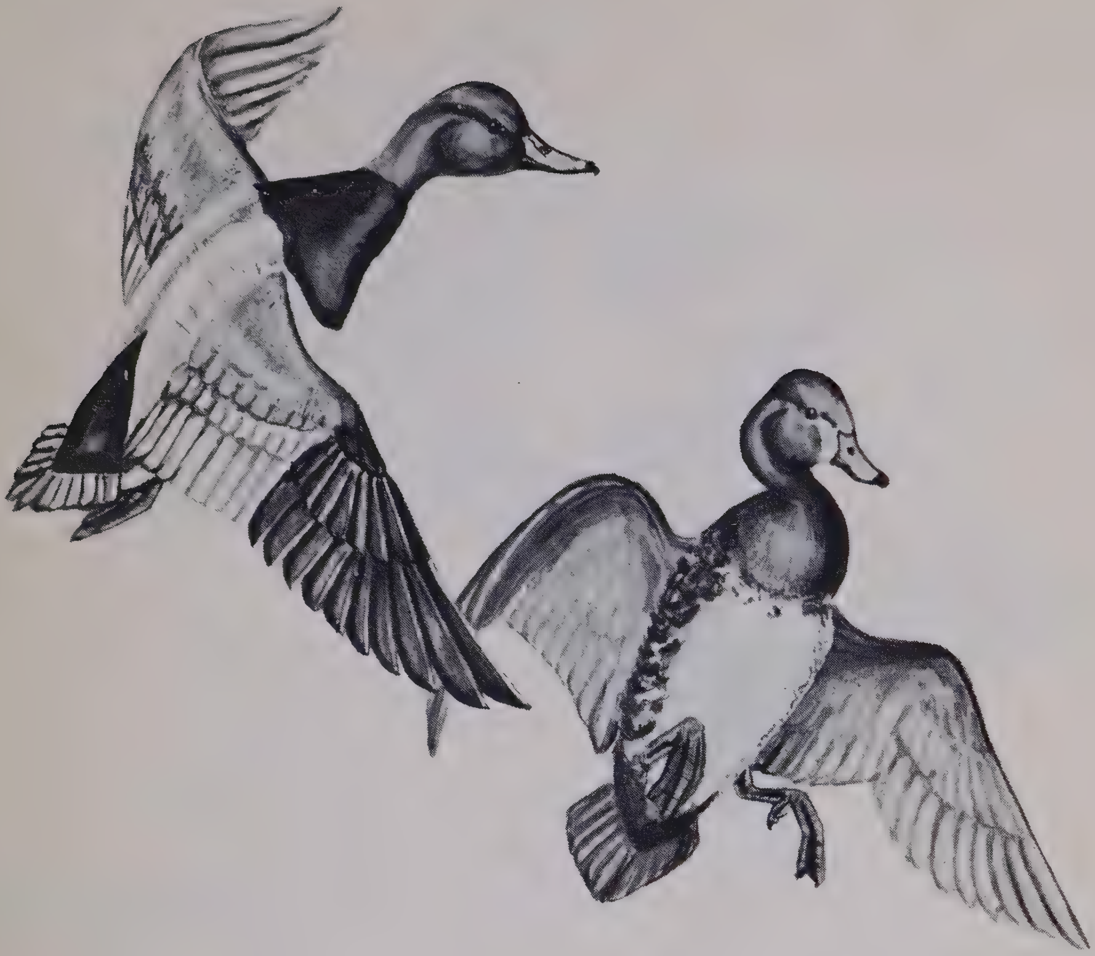
Food

Underwater roots, plants, wild celery, shrimp, shell fish and pond weeds.

Remarks

Extremely powerful flyers, migrating in lines and irregular vees. Wingbeat is rapid and noisy. On water, body size and head shape distinguish them from scaups and redheads. At all seasons large size and shape of head will distinguish the canvasback. The crown slopes gradually back from the beak, the line from the middle of the beak to the back of the crown being practically straight. Drakes croak, peep and growl. Hens quack, similar to a mallard hen.





REDHEAD

Identification

Male: Head and upper neck chestnut. Lower neck, breast and upper back brownish black. Back, wings and sides are white with fine wavey black bars. Lower belly and breast are white. Female: Head and neck dull reddish brown, paler on foreneck and white on chin. Back and wings dark greyish brown. Upper breast and sides brownish. Remainder of underparts white with brown mottling.

Range

Throughout northern and central Alberta. Winters from southern B.C. to Mexico and West Indies.

Nesting

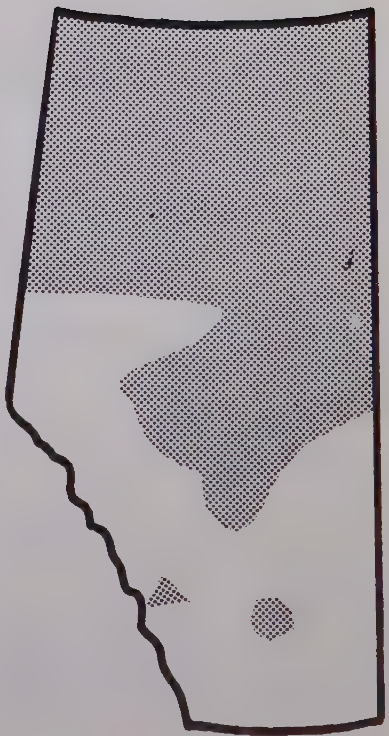
In clumps of reeds and rushes over water. Nest of reeds lined with moss. Eggs 8 - 14, cream or buff.

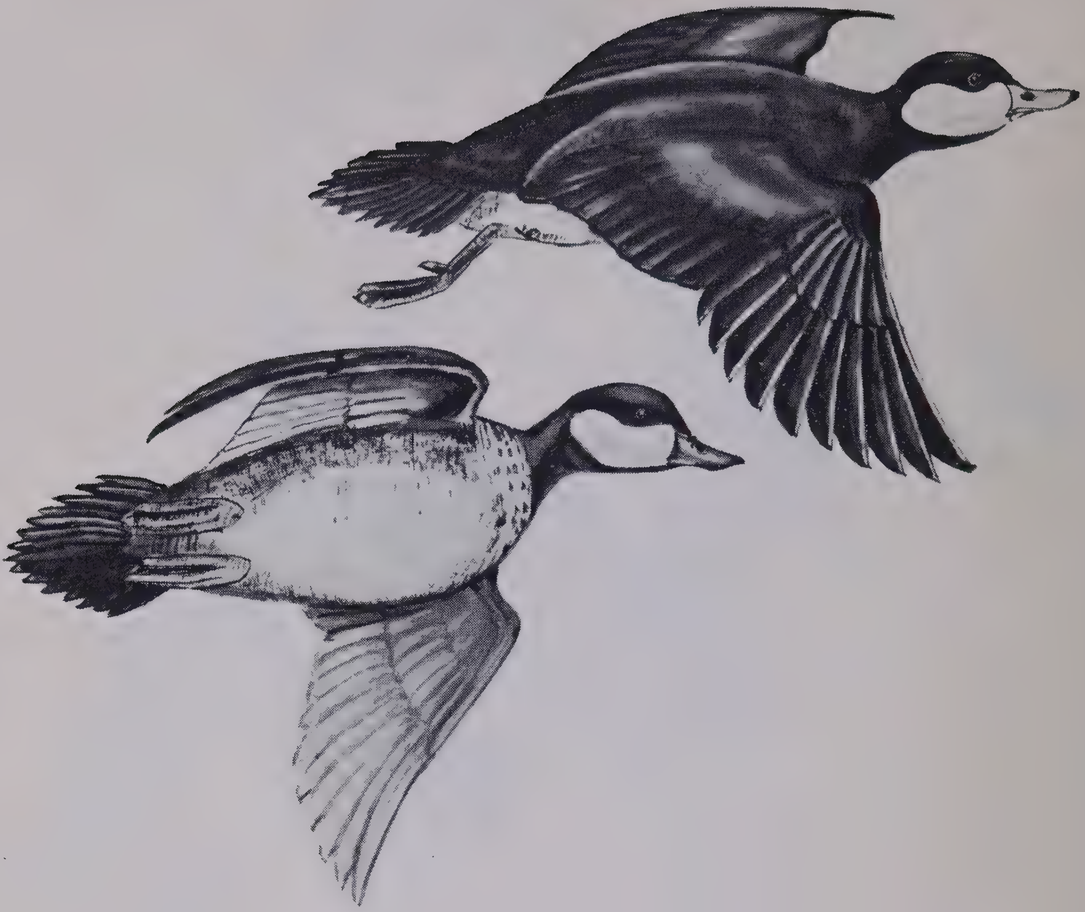
Food

Mostly vegetation; leaves, sedge weeds, roots, bulbs and various insects.

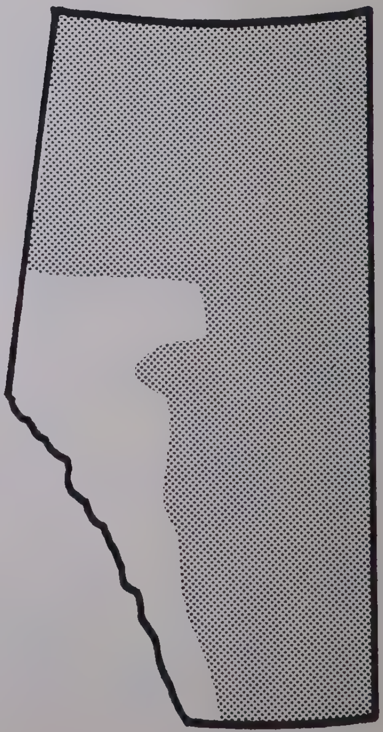
Remarks

Often found with canvasback. During migration, large flocks are seen. Movements in the air always seem to be hurried. Usually spends the day in large rafts on deep water. Feeds morning and evening in shallower sections. A large diving duck most easily confused with the canvasback.





RUDDY DUCK



Identification

Male: Crown and nape black, with face, cheeks and chin white. Neck and upperparts reddish brown becoming blackish on rump and tail. Underparts greyish white with wavey brownish bars most distinct on sides. Large bright blue beak. Female: Underparts dull black, darkest on crown with some faint barring. Face, cheeks and chin dull white, with a faint dusky line from base of beak to ear. Remainder of underparts greyish.

Range

Throughout Alberta, except in mountains. Winters from northern U.S. to Central America.

Nesting

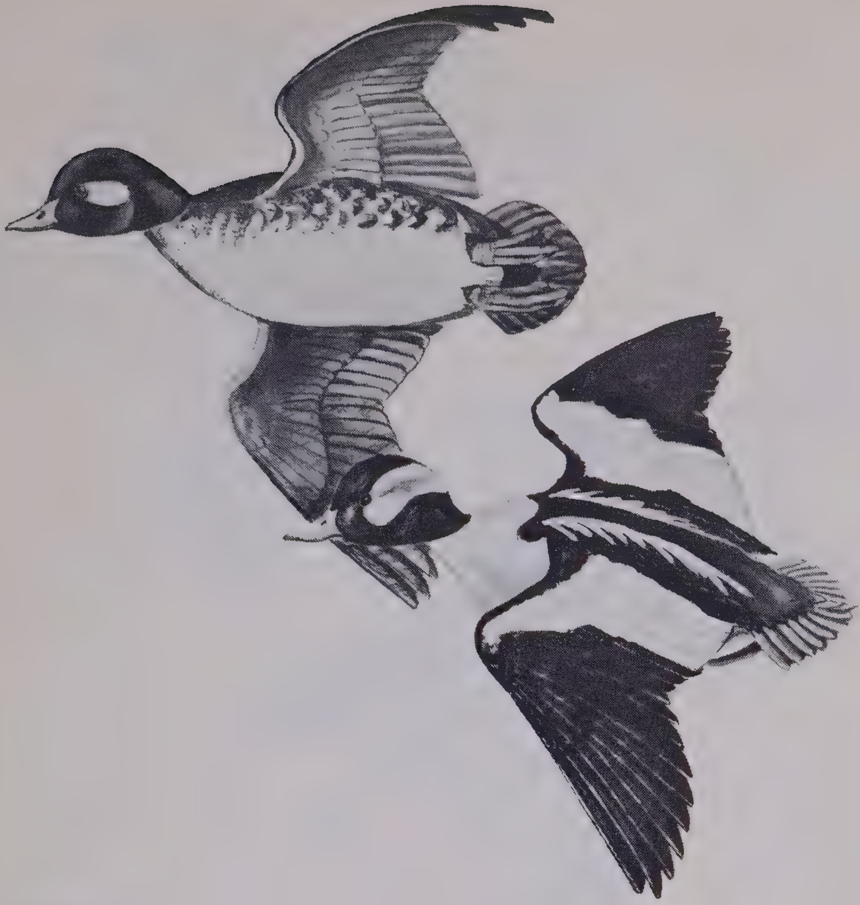
Usually over water. Nest of reeds and rushes securely attached to rushes just inches above water.

Food

Mainly pondweed and aquatic insects.

Remarks

This duck will often swim away or dive rather than flush. Its rise from the water is awkward, seemingly with great effort. Once under way, flight is sometimes jerky, noisy, and of uneven pace.



BUFFLEHEAD

Identification

Male: Feathers on head are long giving it a puffy appearance. Black on head has a purple and green sheen. Large white V from the eye across the top of the head. Back, black shading to light grey on tail, bordered with white at base of wings. Wings black except for large white patch on coverts and secondaries. Female: Head not as puffy as drakes, brownish black except for a small white patch behind the eye. Underparts greyish white becoming dark grey on sides and under tail.

Range

Throughout northern and central Alberta. Winters on Pacific and Atlantic coasts, occasionally on the Great Lakes.

Nesting

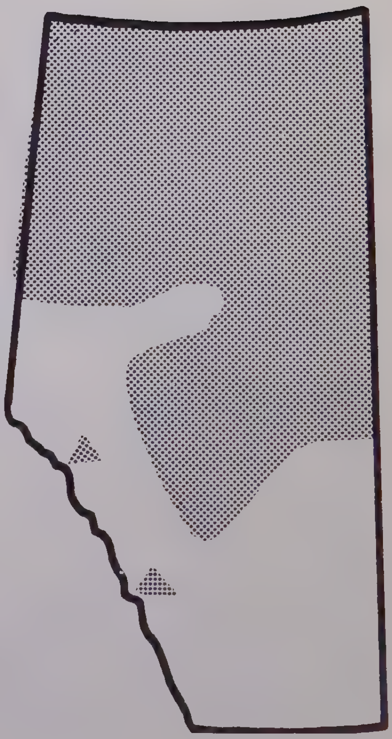
In hollow trees or stumps. Eggs 9 - 14, buffy or creamy white.

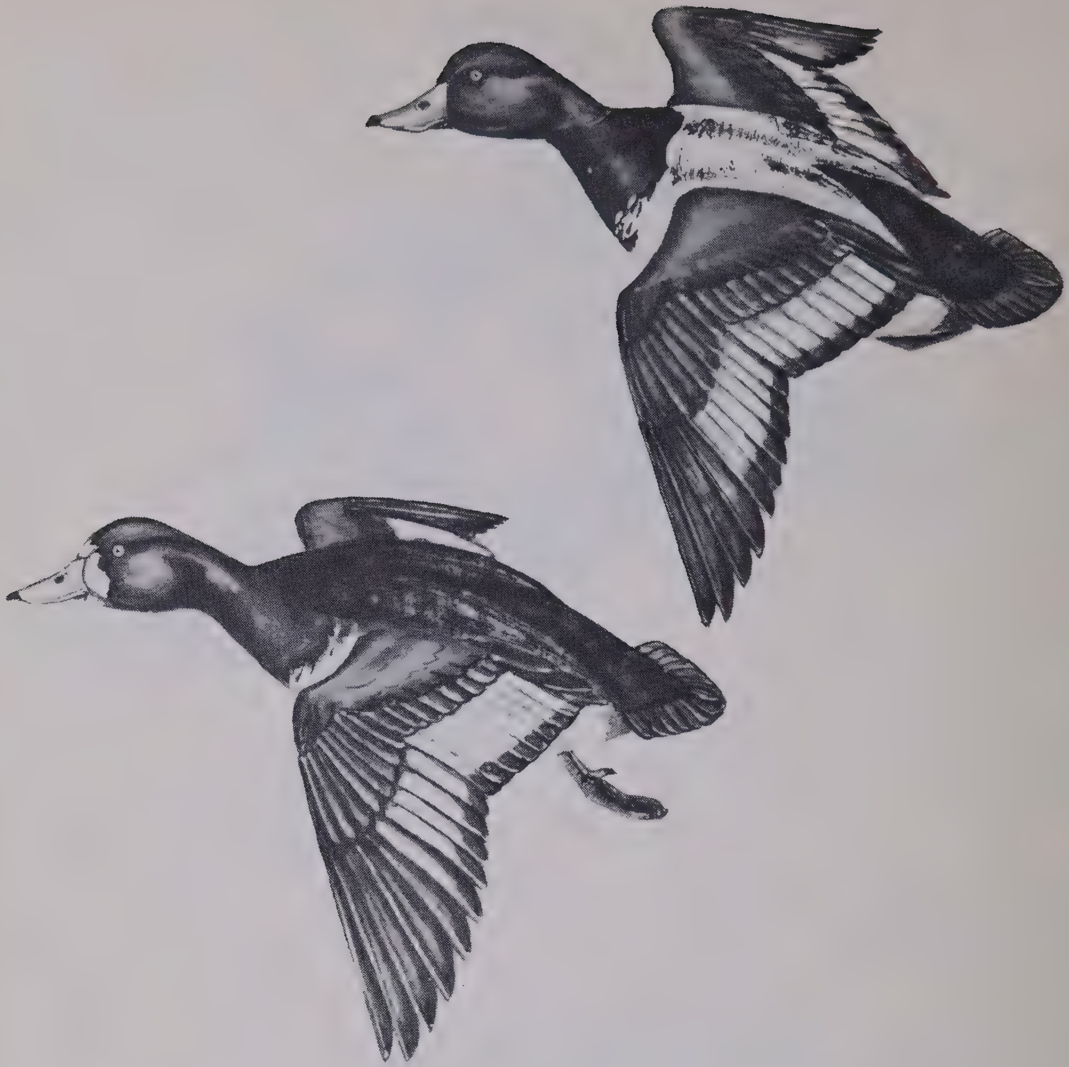
Food

Plant seeds, fish and aquatic insects.

Remarks

Drakes are conspicuous for their black and white design and small size. Flushes straight up or patters along on water. Flocks are small, usually mostly hens and young drakes. Flight is normally low, wing beat rapid. A late migrant, and will remain as far north as open water permits. Each year a few buffleheads spend the winter on the Bow River just south-east of Calgary. Usually silent, drakes squeak, and have a gutteral note. Hens quack weakly.





GREATER SCAUP

Identification

Male: Almost identical to lesser scaup but the iridescence on the head is greenish. There is more white at the base of the primaries, and the sides have less barring. Females of the two scaup species have no real color difference. The species are separated on the basis of size, shape and structure of beak.

Range

There are only occasional sightings of greater scaup in Alberta. Winters along Atlantic coast, from N.Y. State south as far as northern South America.

Nesting

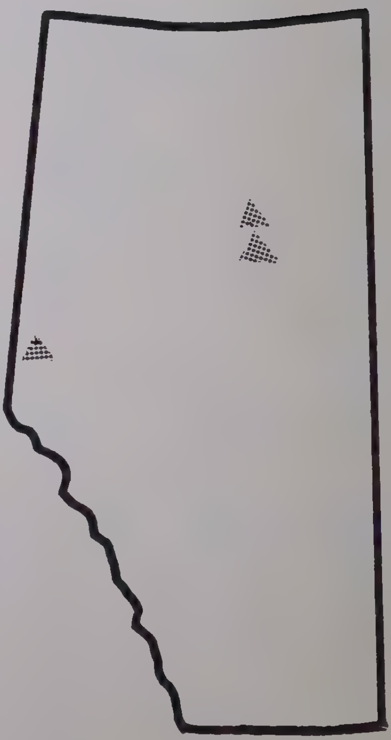
On dry ground close to water. Nest of grass and leaves lined with down. Eggs 8 - 12, olive buff.

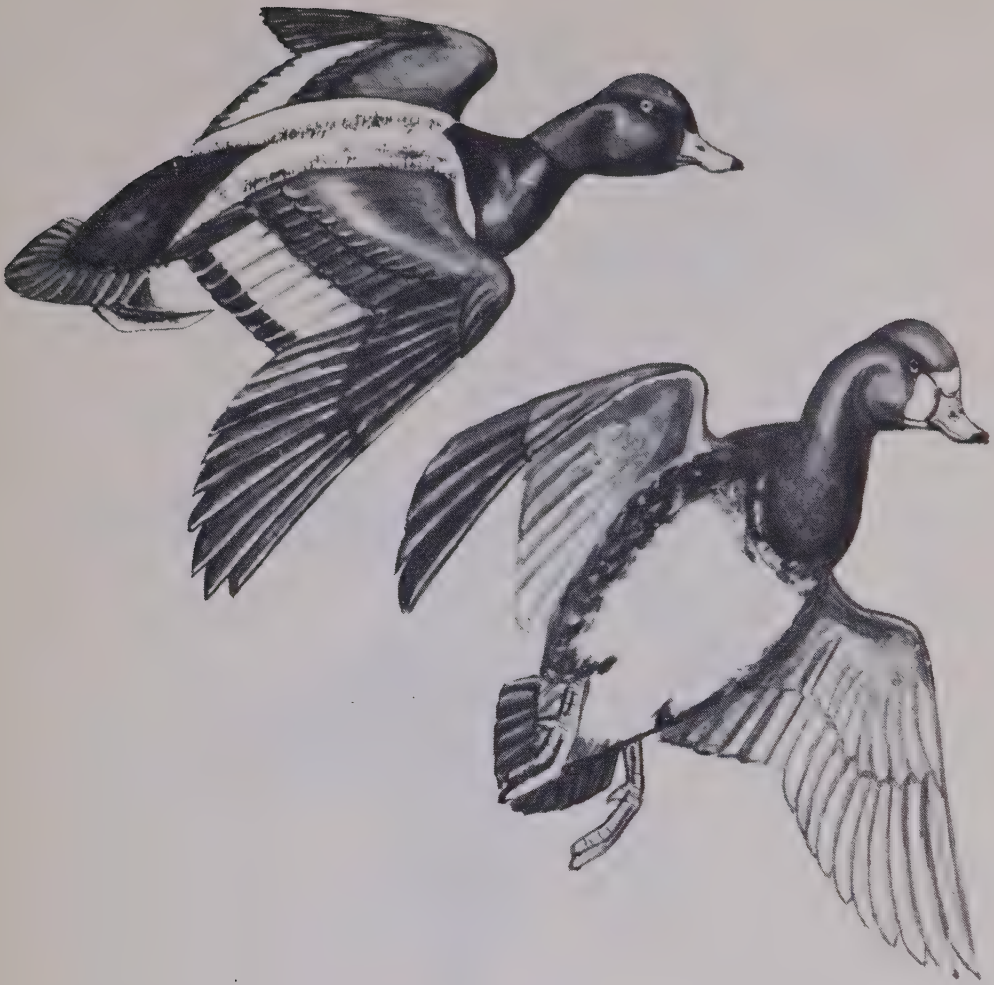
Food

Various aquatic plants and insects.

Remarks

Frequents the largest bodies of water, where they raft up during the day. Hunters who find scaups of large size in their bag might save a wing for checking by an ornithologist. From such information, the exact status of the greater scaup in Alberta will be learned. Drakes utter a discordant "scaup". Hens are silent.

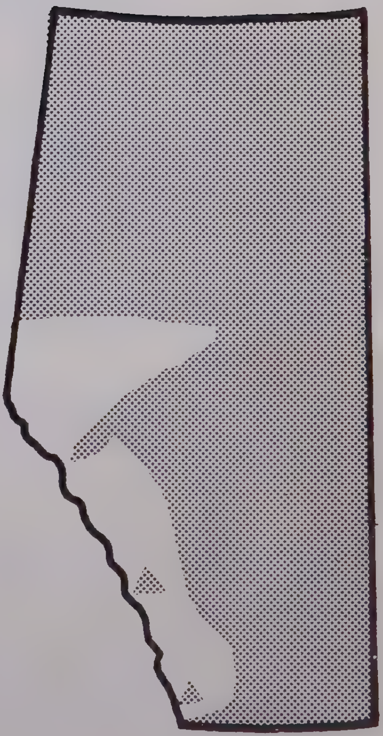




LESSER SCAUP

Identification

Male: Head, neck and foreparts of back and breast black, the head and neck showing purplish iridescence. Back finely barred with black and white producing a wavey effect. Lower back and tail black with iris of the eye yellow. Female: Wide white band or patch around the base of the beak. Sides brown. Greyish brown on back and upper breast with rest of underparts white.



Range

Throughout central and northern Alberta. Winters in southern U.S. and Central America.

Nesting

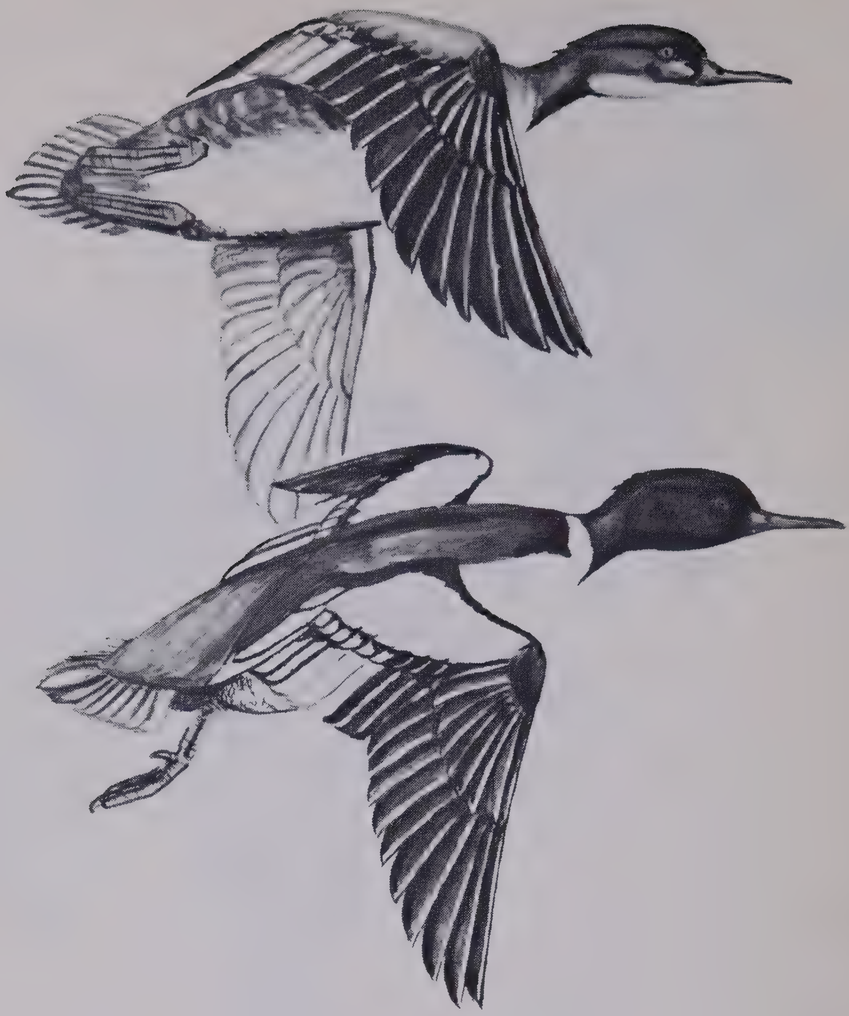
On dry ground close to water. Nest of grasses, leaves, lined with down. Eggs 8 - 12, olive buff.

Food

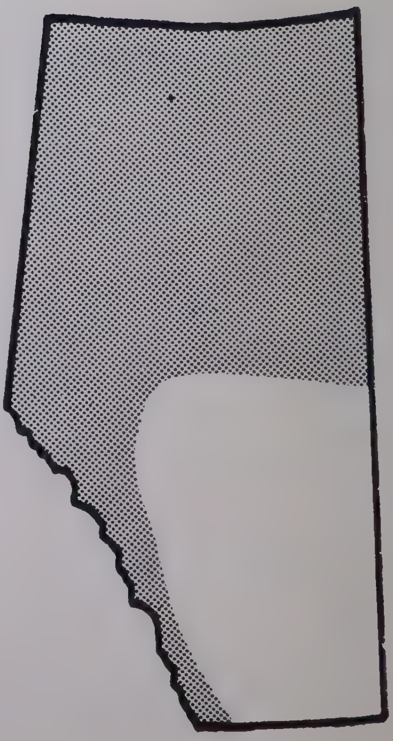
Plants, roots and aquatic insects.

Remarks

The lesser scaup is a late nester and haying operations in early July destroy many nests. Immediately after hatching, the young are led into the water. Here they join other families to form large groups.



COMMON MERGANSER



Identification

Male: Head and upper neck glossy greenish black without evident crest. Lower neck and underparts white with delicate pink blush. Back is black becoming grey on rump and tail. Most of wing and coverts white with single black bar. Iris, beak and legs, reddish.

Range

Throughout north-central Alberta. Winters from southern Canada to Mexico.

Nesting

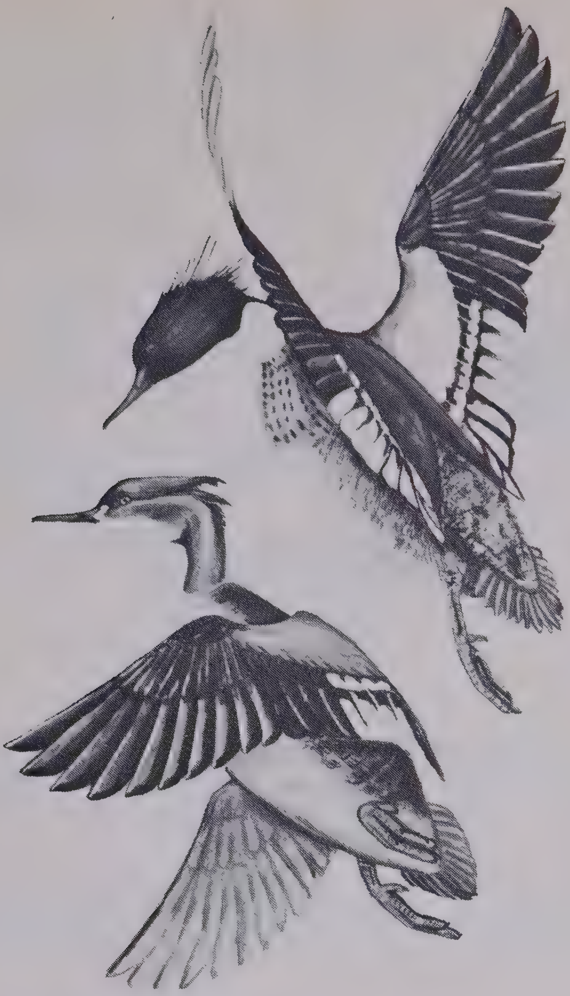
On the ground under boulders or in woods; sometimes in hollow trees. Nest of grass lined with down. Eggs 9 - 15, pale buff.

Food

Mostly fish and aquatic insect life.

Remarks

Mergansers often work as a team, advancing in line over the water and diving for fish which are driven before them. Their flesh is not palatable.



RED-BREASTED MERGANSER

Identification

Male: Head and upper neck glossy green-black. Long, double pointed crest on crown and nape. Back black becoming grey on rump. Two rows of white spots near bend of wing. Wing, except primaries, mostly white with two black wing bars. Reddish brown bar around lower neck, separated from dark head by white ring. Iris, beak and legs red. Female: Ragged crest, head and neck brown fading to whitish on throat. Rest of upperparts greyish brown. Speculum white bordered in front by black-then-white stripes. Sides brownish grey edged with white. Rest of underparts white. Iris, beak and legs red.

Range

Throughout northern Alberta. Winters along Pacific and Atlantic coasts, and Gulf of Mexico.

Nesting

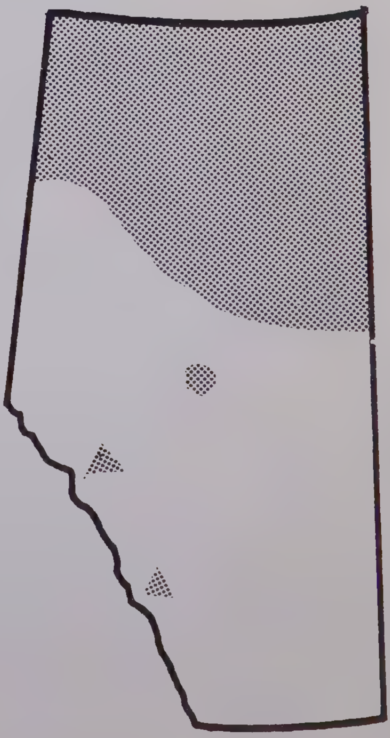
In a crevice in rocks or in dense growth near water. Nest of grass lined with down. Eggs 8 - 10, olive buff.

Food

Fish, snails, various aquatic insects.

Remarks

Juveniles and many adult drakes resemble hens during migration, as adult males grow out of eclipse plumage late. Voice: Croaks, seldom heard. Mergansers are fish eaters with thin bills equipped with saw like edges that help them hold minnows and other small fish.



MULTIPLE RESOURCE MANAGEMENT PLANNING

By JAMES T. NALBACH, B.S.F.

This article presents one method of planning for the broad development of natural resources in the Province of Alberta. This process recognizes the need to identify resource potential, determine the ecological effects of development, and recognize the human involvement. Assignment of uses to crown land take into consideration the capabilities as determined by Canada Land Inventory. Final assignment is based on socio-economic as well as physical factors.

Multiple resource management is the principle that the non-renewable and renewable resources be managed for the present and future generations of Albertans. The resources of public land are outdoor recreation, timber, forage, water, wildlife and fish, minerals and petroleum products. All but the last (minerals and petroleum products) are renewable resources. The ministers of provincial government departments are authorized to develop and administer renewable surface resources and non-renewable subsurface resources for multiple use and sustained yield of the many products and services obtained from these lands. Multiple resource management entails the management of all of the various renewable surface resources so that they are utilized in the **combinations** that will best meet present and future needs on areas large enough to conform with changing needs and conditions.

Multiple resource management takes into account the relative values of the various resources in a particular area. The department ministers are authorized to direct, develop and administer the renewable and non-renewable resources of crown lands for a multiple use and sustained yield of the several products and services which are obtained therefrom. The establishment and maintenance of wilderness areas is consistent with this purpose.

Planning must take into consideration the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustment, to conform with change and needs and conditions. Nothing in this principle indicates that all of the land will be used for all of the resources. It is essential that combinations of resources be compatible or complementary to each other, and at no time conflicting to the extent that the productivity of the land is reduced. In some cases this may mean that a combination of uses is not necessarily that combination which will give the greatest dollar return or the greatest unit output over the short run.

MANAGEMENT

Management is the process of achieving goals through organizational systems. Multiple resource management is the interaction between resources and peoples' wants and needs.

A discussion of multiple use often relates primarily to five resources — the renewable surface resources of soil, water, timber, forage and wildlife — along with recreation, meaning the recreation opportunity. Minerals, because of their different character are not always listed. They are not renewable in the usual sense, their distribution is generally erratic, and they are often under the surface. Nevertheless, where they do occur and are exploited, their extraction often has real effects on the surface resources, and thus become an important part of multiple use management. In a very real way, we manage the method of their exploitation to protect other resource values.

CONSERVATION PLANNING

Some renewable resources require a long time period for their production. In the economic sense, conservation is deferring use to the future. Its antithesis, depletion, is accelerated use in the present. The optimum state of conservation is that which maximizes the present value over a planning period. **Present value does not mean "current market value"** but relates to the present and future value of the resources discounted to today. The planning period for renewable resources is perpetuity. Plan-

J. T. NALBACH

Planning Period for Timber — 80 years for pulp; 150 years for sawtimber.

J. T. NALBACH

Streambed Erosion

ning intervals occur within the planning period. Planning intervals are points in time where rates of use are adjusted to maximize present value resulting from changing market conditions and human values.

The rate of extraction affects the ability of renewable resources to perpetuate themselves naturally.

Resource values change as peoples' wants and needs change. If demand is to be met in the future, long range planning of production and use rates is required. (Productivity of renewable resources can be accelerated only slightly over the time nature requires, regardless of peoples' demand.) The limits vary with the region's ecological constraints.

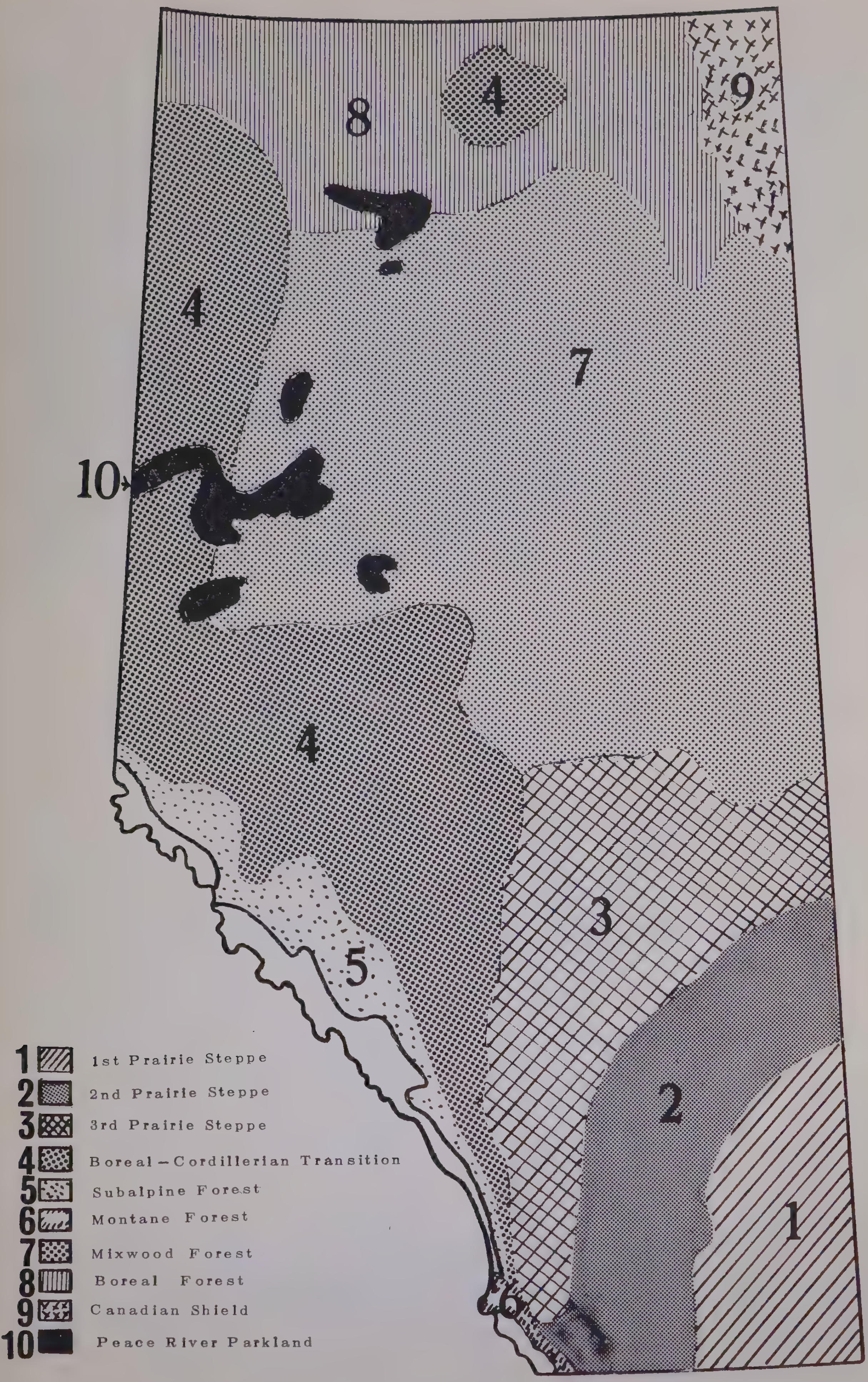
Good management means higher returns in proportion to management input. As progress is made from protective and custodial status to management, resource output and returns increase markedly.

In order to achieve these goals the Department of Lands and Forests has established a Land Use Assignment Section. The broad responsibilities of the section are to identify resource potentials, determine the environmental constraints, recognize human involvement, and plan the present and future uses of lands on the basis of ecological regions.

INVENTORY

In order to establish the broad basis of a biophysical inventory, it is necessary to divide the province into ecological regions. The ecological management regions outlined on the accompanying map of Alberta have been selected on a basis of broad similarities and management situations, lending themselves to more specific management direction in related co-ordinating instructions than would apply to the province as a whole.

This takes place because the climate and soils, the vegetative and animal components are similar. Along with this, the major activity of the human resource user who operates prudently will reflect the ecological opportunities and constraints of the region in which he is located. Combinations of factors rather than single factors are the dominant consideration in the delineation of these ecological regions.


8
4
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1 1st Prairie Steppe
2 2nd Prairie Steppe
3 3rd Prairie Steppe
4 Boreal – Cordillerian Transition
5 Subalpine Forest
6 Montane Forest
7 Mixwood Forest
8 Boreal Forest
9 Canadian Shield
10 Peace River Parkland

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Planning Period for Soil — 800 years for 1″ of topsoil to be formed naturally.

Each ecological region contains one or more Special Management Zones. This sub-zonation is necessary for management considerations imposed by the ecological constraints of the site. Alberta has several well defined Special Management Zones which are of special significance because of value or environmental constraint. Delineation of these zones recognizes that special management is required which differs from the general management direction for the region.

IMPLEMENTATION

In order to implement this concept of total resources development for the optimum benefit of the people of Alberta, certain changes in legislation, acts, and regulations, will be necessary. Rapidly increasing human populations and resulting pressure on the resources are being felt everywhere. In Alberta these pressures are being brought to bear on a system which is forced to advance rapidly in intensive resource management and use, after a history in which the emphasis was necessarily on protection of forest resources, and single use development for agriculture on every single piece of potentially arable land.

On one hand a vast resource is practically untouched and in the pioneering stages of management; on the other, areas of preferred easy access to resources have long histories of single use management and development. Marked changes in thinking, conversion of management outlook, and resource utilization practices will be necessary in order to implement these principles. Emphasis on this aspect will increase in proportion to the increasing wants and needs of the people and the relative value that they place on the resources. Stability which results from long settled and established patterns of use is lacking in relation to the more remote resources or less customary types of resource utilization practices. An essential element in resource development and management is the interlacing and integrating of all uses so as to interfere with each other as little as possible, and to supplement each other as much as possible, without impairment of the productivity of the land.

J. T. NALBACH

Good Management Means Higher Returns

Rapid developments and significant changes in economic patterns are taking place throughout the province. Broad appraisal of resources on crown land in these changing conditions and of the new impacts on these resources have resulted in the preparation of this Multiple Resources Planning article. It is hoped that the concepts outlined will help readers understand the necessity of careful planning.

J. T. NALBACH

Resource Values Change as People's Wants and Needs Change

NEW TROPHY FISH RECORDS FOR ALBERTA

BY DENNIS McDONALD
REGIONAL FISHERY BIOLOGIST, CALGARY, ALBERTA

The spring, 1968 issue of *Alberta Lands, Forests, Parks, Wildlife* carried an article by the writer in which a list of game fish records for Alberta were proposed (1). In the two years since that time, several new records have been established while others have been amended due to information provided by the readers of this magazine.

GOLDEYE

On June 24, 1967, Jim Shannon of Brooks cast a silver and red Kamlooper spoon into the murky waters of the Bow River below the Bassano Dam and hooked what proved to be a truly remarkable fish. When landed, the goldeye on his line was undoubtedly the largest representative of this species ever recorded in the world. Several hours following its capture, after the gills and entrails had been removed, the fish weighed 64 oz. (4 lbs.) on the government inspected weigh scales of the Centennial Grocery in Brooks. This is a full pound in excess of the previous Alberta record, a 3 lb. fish taken from the South Saskatchewan River by L. Fode in 1963, and 14 oz. more than the largest goldeye ever recorded in a commercial fishery (2). Had Mr. Shannon recognized the significance of his catch and taken measures to preserve it for weighing, he might have added an additional pound to his new record for a spring scale on which the fish was weighed at streamside registered 5 pounds. Unfortunately neither the length of the fish was recorded nor were photographs taken but Bill Mark, owner of the Centennial Grocery, Larry Kimura and Frank Nesbitt, both of Brooks, witnessed the weigh-in.

The second place standing in this category is now occupied by a 3 lb. 6 oz. goldeye taken in the Red Deer River in 1962 by Bob Nelson. It also exceeds the former records previously cited.

BROWN TROUT

The former Alberta record brown trout, an 8 lb. 2 oz. fish taken from Obed Lake near Hinton in 1965 by William Shpeley, has now been surpassed by two new records. The first, an 11 pound brown captured in Swan Lake on July 4, 1967, by Frank Halase of Drumheller, now occupies second place in the standings. The current record is a magnificent 12 lb. 5 oz. Loch Leven taken 31 years ago in Lake Edith, Jasper National Park, by William Wachter of Nanaimo, B.C. Mr. Wachter forwarded evidence of his catch following publication of the writer's earlier article on trophy fishing. The former Alberta resident's record brown trout measured 31 inches in length and 15 inches in girth.

The writer was unable to establish the authenticity of a report of a 17 lb. brown trout supposedly taken from the Elbow River in Calgary in 1968.

DOLLY VARDEN

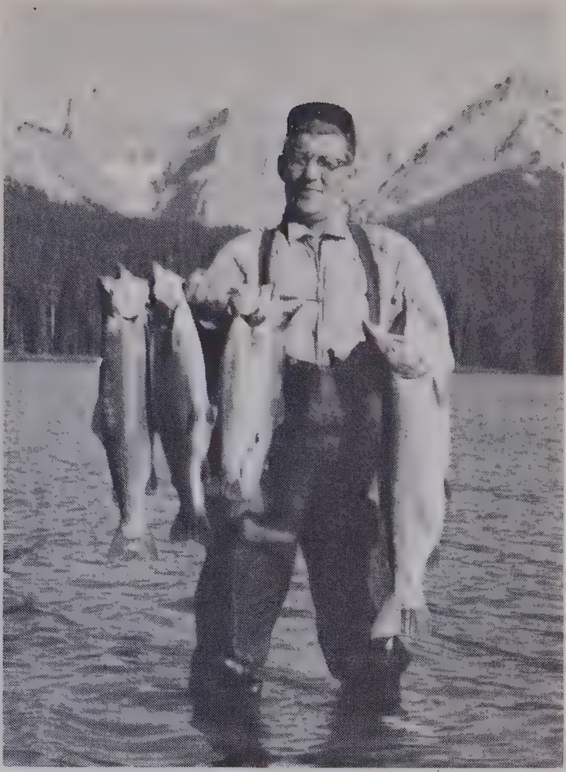
On July 13, 1969, Lee Hanson hauled a 14 lb. 13 oz. Dolly Varden from the icy waters of Brazeau Dam reservoir to establish a new provincial record for this species. The char measured 33½ inches in length and exceeded the previous record by 11 oz. Another large Dolly Varden captured in Lower Kananaskis Lake by Bob Machum of Priddis registered 16 lbs. on a spring scale at the Kananaskis Ranger Station. Unfortunately, however, the fish was gutted and frozen without being weighed on a government inspected scale and therefore cannot be recognized in the official records.

The former provincial record Dolly Varden was a 14 lb. 2 oz. fish taken in an unnamed river in the Edson area in 1949 by W. L. Yorke.

CUTTHROAT TROUT

To the writer's chagrin, Allen Bill, a noted outdoor columnist in Alberta, has pointed out that the beautiful 9 lb. 8 oz. cutthroat trout taken by Douglas Newton of Calgary in 1966 and formerly cited as the provincial record for this species was actually caught in British Columbia. Sunburst Lake, the former residence of this magnificent fish, lies just across the Alberta border in Mount Assiniboine Provincial Park in B.C.

The new Alberta record for this species is now recognized as the 8 lb. 15 oz. cutthroat taken from Lower

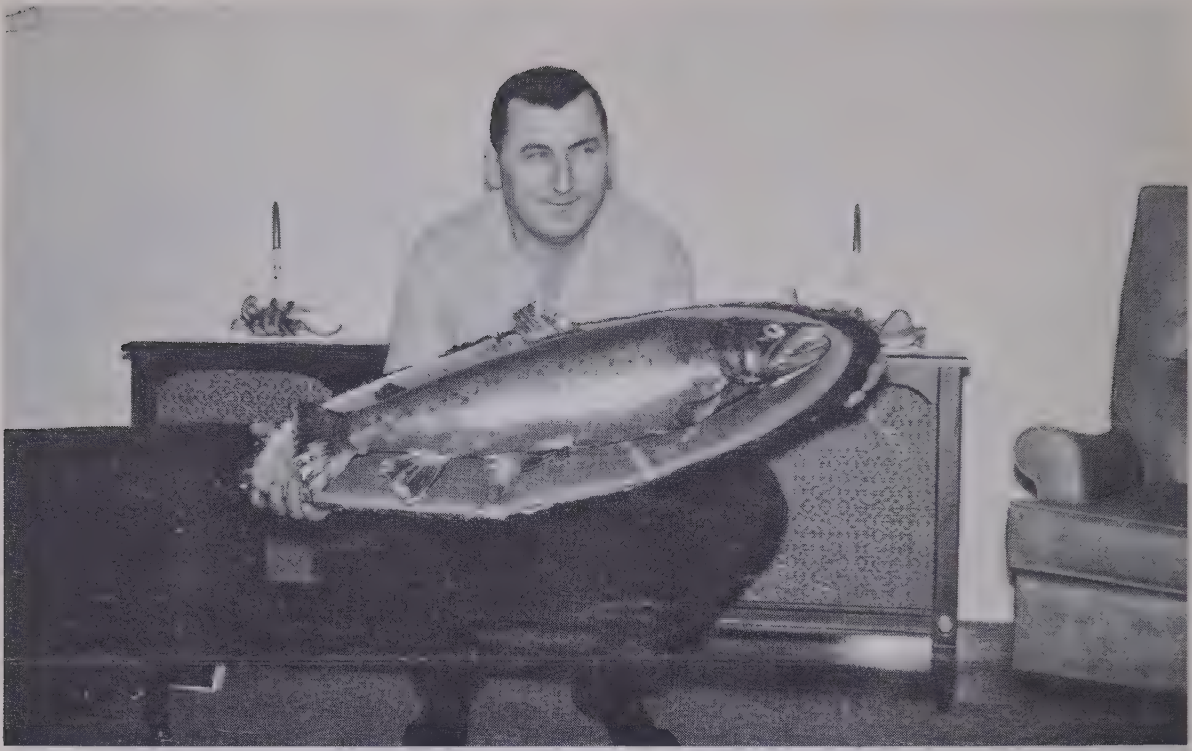


MRS. OVAR UGGEN

Mr. Ovar Uggen of Calgary with Rainbow Trout up to 10 lbs. from Horseshoe, Lake, Alberta.

MRS. D. NEWTON

Doug Newton, Calgary Alberta. 9 lb. 8 oz. Cutthroat Trout, August 13, 1966. Mt. Assiniboine area, Sunburst Lake, B.C. Fish formerly mistaken as the Alberta record (see article).



MRS. FRANK HALASE

Mr. Frank Halase with mounted specimen of 11 pound Brown Trout taken from Swan Lake on July 4, 1967.

Kananaskis Lake in September, 1950, by Mrs. Ovar Uggen of Calgary.

SPLAKE

The splake, which is a hybrid cross between the lake trout and the brook trout, has been stocked in a few waters within the national parks in Alberta. Recent plantings of this species in Pine Lake in Wood Buffalo National Park (from which the existing record Alberta brook trout was taken in 1967) produced a 12 lb. 12 oz. lunker for G. Barham on July 19, 1968. The fish measured 30 inches in length and is now recognized as the Alberta record for this species.

OTHER NOTABLE CATCHES

In addition to the new records established over the past two years, several records were closely challenged by trophy fish taken throughout the province. Don Hankel of Tilley reeled in a 31 lb. 8 oz. northern pike in Cowoki Lake on June 26, 1969. The 44 inch fish was captured on a red and white spoon and came within ½ pound of the existing Alberta record for the species. An 8 lb. 6 oz. brown trout taken in Obed Creek on August 3, 1968, by Frank Fy was large enough to beat the existing record by 4 oz. but it has since been exceeded by the two browns cited previously in this article.

Bob Scammell, an outdoor columnist in Red Deer, pointed out that a 10 lb. 10 oz. brook trout was taken out of Upper Stoney Creek in 1956 by Ted Betts of Calgary. Mr. Betts has since informed the writer of a 9 lb. 9 oz. brook trout and a 9 lb. 6 oz. brook trout taken from the same waters that year. The existing Alberta record for this species is 12 lb. 14 oz. (Table 1).

In 1968, Mr. V. Kopas came within 12 ounces of establishing a new record with a 5 lb. 15 oz. lake whitefish from Fickle Lake while Mr. T. Konowalec came even closer to breaking the world record for Rocky Mountain whitefish. His 4 lb. 5 oz. fish taken in the Athabasca River on August 4, 1968, was 11 ounces less than the 5 lb. mountain whitefish captured by Orville Welch of Edmonton in the same river on June 3, 1963.

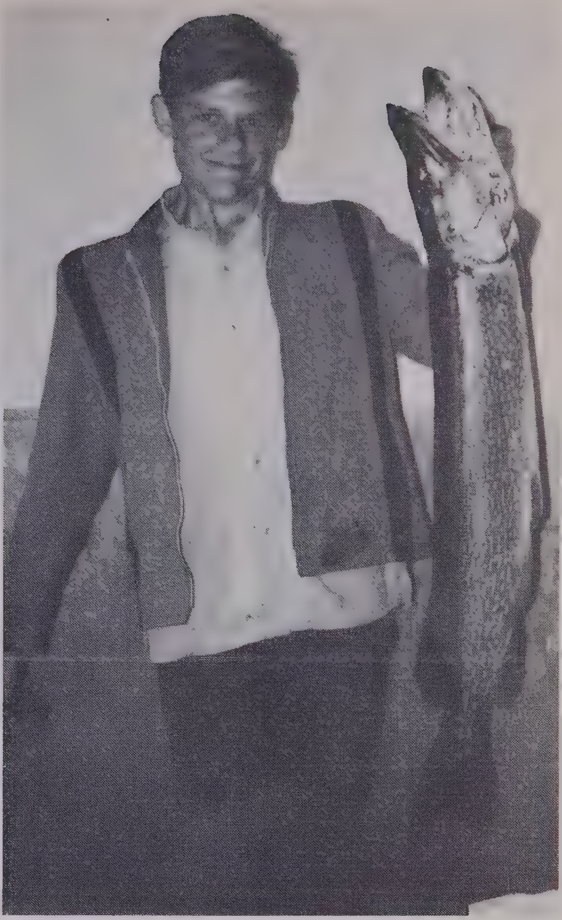
The Athabasca River also yielded a 13 lb. 13 oz. walleye to E. Prazak on October 2, 1968. It came within 3 ounces of the present record. On April 12, 1969, Jack Graham landed a 2 lb. 3 oz. yellow perch in Ironwood Lake which missed tying the Alberta record by one ounce!

Two large rainbow trout taken in recent years are the 13 lb. 1 oz. fish taken by J. Takaski in Cavan Lake on March 28, 1968, and the 13 lb. 2 oz. rainbow trout taken in the Bow River below Carseland by Ray Davidson of Calgary in June, 1969. The 15 lb. trout taken in Mami Lake by W. Paschuk still tops the list in this category.

It is clear that many new records will be set for Alberta game fish in the future and the readers are invited to forward information pertaining to catches which exceed those cited to:

Director of Fish and Wildlife
Natural Resources Building
Edmonton, Alberta.

New records should be accompanied by evidence of the fish having been weighed on government inspected scales in the presence of at least two witnesses excluding the angler. Length and weight information as well as a photograph of the fish to confirm identification are requested. Readers having knowledge of fish taken by angling in Alberta in former years which exceed the records cited in Table 1 are invited to forward references to confirm these catches.



TOM HANKEL

The 31 lb. 8 oz. Northern Pike taken by Don Hankel in Cowoki Lake, June 26, 1969.

References Cited:

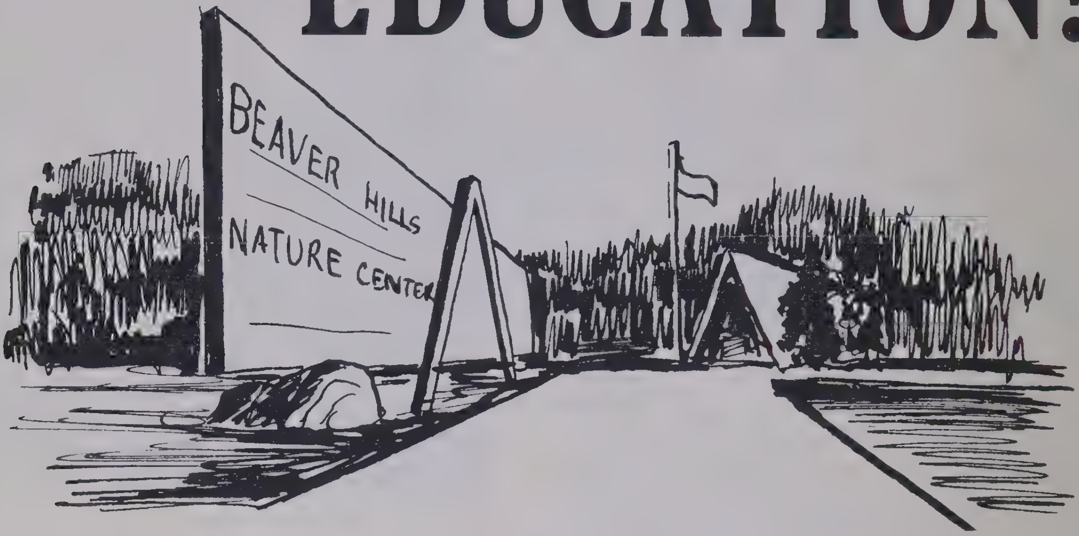
1. McDonald, Dennis "Trophy Fishing in Alberta". **Alberta Lands, Forests, Parks, Wildlife.** Part one, spring issue, 1968; Part two, summer issue, 1968.

2. Kennedy, W. A. and W. M. Sprules **Goldeye in Canada.** Fisheries Research Board of Canada, Bulletin 161, Ottawa, 1967.

TABLE 1 **Alberta Game Fish Records — 1970**

SPECIES	WEIGHT	LENGTH	LOCATION	DATE	ANGLER
Brook Trout	12 lb. 14 oz.	—	Pine Lake, Wood Buffalo Nat. Park	1967	Don Jenkins, Fort Smith, N.W.T.
Brown Trout	12 lb. 5 oz.	31"	Lake Edith, Jasper National Park	1939	William Wachter, Nanaimo, B.C.
Cutthroat Trout	8 lb. 15 oz.	—	Lower Kananaskis Lake	1950	Mrs. Ovar Uggen, Calgary, Alta.
Dolly Varden	14 lb. 13 oz.	—	Brazeau Dam Reservoir	1969	Lee Hanson, Breton, Alberta
Golden Trout	4 lb. 7 oz.	—	Barnaby Ridge Lake	1965	Grant Campbell, Edmonton, Alta.
Rainbow Trout	15 lb. 0 oz.	34½"	Mami Lake	1967	Walter Paschuk, Magrath, Alta.
Lake Trout	52 lb. 8 oz.	—	Cold Lake	1928	Mrs. Erickson, Galahad, Alberta
Splake	12 lb. 12 oz.	30"	Pine Lake, Wood Buffalo Nat. Park	1968	G. Barham, Fort Smith, N.W.T.
Mountain Whitefish	5 lb. 0 oz.	19"	Athabasca River	1963	Orville Welch, Edmonton, Alta.
Lake Whitefish	5 lb. 11 oz.	—	Lac Ste. Anne	1966	H. Burchett, Edmonton, Alberta
Arctic Grayling	2 lb. 13 oz.	—	Embarrass River	1966	F. R. Bush, Edson, Alberta
Walleye	14 lb. 0 oz.	—	Pembina River	1960	Milt Jensen, Athabasca, Alberta
Yellow Perch	2 lb. 4 oz.	15"	Tucker Lake	1967	R. Gauchier, Bonnyville, Alberta
Northern Pike	32 lb. 0 oz.	50½"	Jackfish Lake	1948	R. Knudslien, Edmonton, Alberta
Goldeye	4 lb. 0 oz.	—	Bow River below Bassano	1967	Jim Shannon, Brooks, Alberta

WHY ENVIRONMENTAL EDUCATION?



EDO NYLAND, B.S.F.

Our cities are rapidly increasing in size, and people are becoming more and more urbanized. This may be observed all over North America. Daily it becomes more obvious that contact with nature and the peace and quiet of out-of-doors is felt as an urgent need by the many thousands of people who leave the cities on weekends and holidays to escape from the pressures of city life.

The mistreatment of the landscape, its plants and wildlife, is forcing the land-owner to institute measures which greatly restrict the use of his land by city people. The high cost of maintaining roadside camp and picnic sites and the cleanup of littered roads creates the need for laws and restrictions as well as costly supervision.

It is a tragic fact that very few cities escape the utter destruction of their original environment, often to the point where a desert may be preferable to what is being created. Garbage dumps, old car lots, heavy equipment storage, poorly planned trailer villages, shack towns, and industrial areas degrade the landscape.

To correct this, and it must be possible to do so, an immense program of education, experimentation and political organizing will be needed. The present land management strategy is not as much in need of regulations as radical reorganization. This difficult task, if done right, will not only save or improve our environment but will help prevent physical and mental degeneration of the human race.

Edmonton and the other cities in Alberta have not escaped environmental degradation. One only has to talk to old timers to hear stories of creeks. where as kids they used to catch trout, sloughs where they shot ducks, or lakes where they used to boat and swim. The creeks are gone; dried up and filled in. The sloughs are now hay meadows and the lakes have become sloughs with little or no value.

Yellow Perch

The provincial government is vitally concerned about the changes effected by irresponsible land use. This is best illustrated by the many Acts and Regulations already passed to protect our soil, water, wildlife, vegetation and air. Our ever increasing population demands more and better planning, regulation and supervision if we want to pass on our heritage in as good a condition, and preferably better than we received it.

Time and time again man has proven that his control over the environment is profound, yet he shows little understanding of it. His ability to change the face of the earth and to destroy nature is almost beyond belief, but he shows no concern about how his actions affect him in the long run. He must learn to exercise his stewardship over nature and create a strong awareness, appreciation and understanding of it.

In the writer's opinion, education in environmental matters is vitally important and if done in a responsible and honest way, will undoubtedly have the required beneficial results.

Heart-leaved Arnica

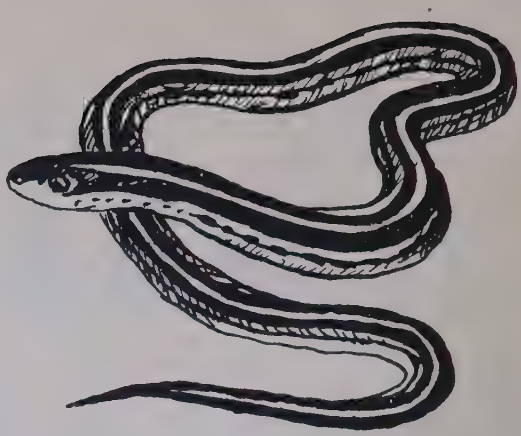
Leopard Frog

We must recognize man's responsibility as the steward of the environment.

Laurance S. Rockefeller put it this way: "Quality environment, like freedom, must be protected and achieved anew by each generation. In this connection, education is an especially urgent need in urban areas where young people increasingly have been removed from the natural world. In these settings, we must create the opportunity and atmosphere for a new learning experience. A vast network of nature-centers and outdoor classrooms should be established, particularly in those places where great numbers of people, adults and youth alike, can learn by direct experience the essentials that underlie environmental quality."

Edmonton in this respect is fortunate indeed. There are many unspoiled places near the city where such places of learning could be established. The need has existed for some time but in Alberta only Calgary has made an attempt toward this goal. The catch'm, hold'm, squash'm attitude of the child toward small wildlife is being accepted as normal. He has no idea of what the natural world looks like, no idea of what type of flora and fauna might be encountered at such an environmental school. This TV generation fully expects a Tarzan, Daktari, Untamed World or Gunsmoke sort of outdoors, replete with monkeys, boa constrictors, buffalos and lions. We must therefore create an impression of what a field-trip is and what it entails. The types of wild and domestic animals which may be met at the outdoor school, their habitat, food and way of life must become part of the child's experience.

Prairie Falcon



Garter Snake

The child is not interested in learning technical words, counting stamens or memorizing elaborate lessons. The important thing is to create a feeling for all that lives and an understanding of how it all fits together in one well balanced interrelationship. He should realize that man can upset this environment. Even though man may feel justified in wholesale condemnation of creatures like wolves, bears, coyotes, cougars, magpies, birds of prey, etc., the imbalance only exists in the eyes of man. With our increasing population we cannot avoid conflict with the animals of the wilds, but judicious and wise planning can minimize this conflict.

The curriculum at an environmental center should therefore be entirely outdoor oriented, whether the children stay only a day or for a whole week. The most receptive ages usually are 10 and 11, but grade 6 children are more mature and better able to profit from the unique experiences offered. The projects upon which the course is based should be: 1. Nature trails of varying lengths, including interests such as wildlife, plants, geology, forestry, and water management. 2. Weather and climate, through actual instrument readings. 3. History and crafts of the local population. 4. Children's farm to acquaint them with domestic animals. 5. Grazing improvements in a natural landscape. 6. Forest plantations to be established by the children themselves. 7. Observation tower to see the world from above, the topography, improvements, and information about fire detection. 8. Arboretum to show a large variety of native and foreign hardy trees. 9. Wildlife improvements for all native wildlife and especially migratory birds. 10. Nestbox construction and placing.

Many more activities could be listed, all designed to bring the child into contact with our natural environment. The curriculum would therefore be designed to create an awareness and appreciation of all that lives and all that makes life possible.

This program should not be confused with the very successful "outdoor education" of the Department of Youth. Their program is aimed at creative, wholesome and imaginative leisure time living patterns in the outdoors through camping, boating, skiing, snowshoeing, survival, swimming, montaineering, etc., activities which are mostly physical. It has little in common with environmental education, which aims to create a sensitive state of mind, and an understanding of our total environment.

Our schools have made great progress in providing the classrooms with

Wapiti

ingenious learning resources and advanced teaching techniques in order to better prepare the students for our fast changing world. However, the emphasis has been almost entirely directed at indoor education. Only fairly recently have exciting and interesting means been devised to teach nature in those places where it should be taught . . . where the greatest variety of life is. However, a reluctance on the part of many classroom teachers to show their ignorance has kept the teaching of nature inside the school walls. It has therefore become clear that special teachers in environmental education must be made available. These teachers are called interpretive naturalists, and must be able to begin teaching at the very elemental level and to extend their efforts to life's largest dimensions. No profession has a greater challenge.

We could say that outdoor teaching is "knowing reality" while the classroom type teaching may be called "knowing about reality".

It goes without saying that sometimes due to extremes in weather, the outdoor teaching experience must be postponed and replaced by indoor activities. For this purpose a well equipped interpretative building must be available. It should be equipped with films, laboratory, displays, models, arts and crafts, etc. The children's farm should have a comfortable place for a group of children to experience the animals. If the ground is frozen, so that tree planting is impossible the class could come back for a day in spring or fall to complete the program.

Cottontail Rabbit

White Spruce Cone and Twig

Enough work has been done by educators in this field to be able to institute an interesting program immediately. Wherever such a school has been established, children have been exposed to experiences which they will never forget. Teaching is done in groups of about 15, never to exceed 20. Ideally two grade five or six classes would come Monday morning and leave late Friday afternoon, but day trips will always form an important part of the center. For this reason the environmental center should be located no farther than 40 miles from any school in the nearby urban area.

Not only would the center be available for the well adjusted child, but specially adapted courses for blind, crippled, disturbed and retarded children would be the real challenge for the instructing naturalist. Let us help each child understand the world in which he lives, and Alberta will be truly a land for living.

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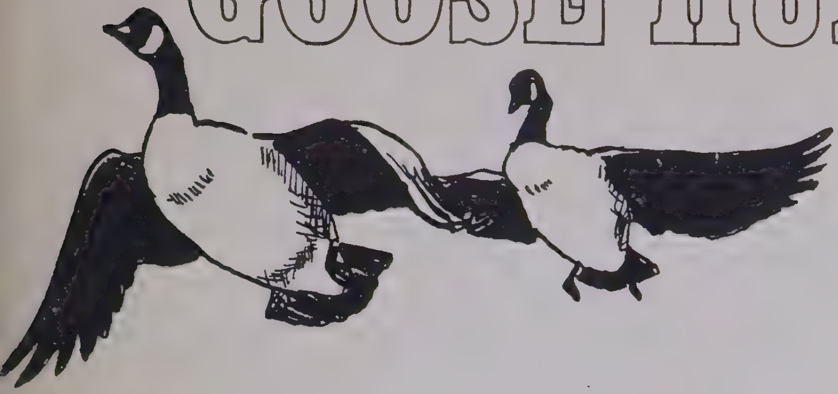
Paradise, Rev. Scott I., Unequal Battle. Connecticut Conservation. Dec. 1969.
Schuylkill Valley Nature Center, Working Philosophies. Sept. 1968.

MORNING-ONLY GOOSE HUNTING



BY DAVID J. NEAVE, REGIONAL WILDLIFE BIOLOGIST, RED DEER

The gabble of geese in the east country may soon be drowned out by the gabble from dissatisfied but ardent goose hunters. The gabble from the hunters is increasing as more goose hunters flock to the staging area, while the harvest of grey geese is at a maximum level and the area for conventional pit-hunters remains constant. To improve the sport of goose hunting, a morning-only shooting restriction coupled with the present protected-waters regulation is advocated by ardent goose hunters. A management decision must weigh the effect of such a restriction (both on people and geese) with the beneficial results only after the pertinent facts are available.

Management of separate and identifiable goose populations such as those in eastern Alberta and western Saskatchewan (part of the central flyway) is aimed at a 3 to 5% population annual increase to compensate for the annual increase in hunters. Production and harvest are critical as neither the Arctic breeding grounds nor the wintering grounds limit population growth. Annual production and subsequent fall flight are the product not only of the spring flight, but of the proportion of non-breeding yearlings in the population, and the Arctic weather. This is evident in the boom production in 1966 (50% of the snow geese population were immatures) compared to the cold, wet spring of 1967 (5% of the snows were immatures). The western sub-population of white-fronts is being slightly overharvested (primarily shot in Saskatchewan and Texas) while the short-grass prairie population of small Canada geese is increasing slightly (primarily shot in Alberta). A large proportion of these geese harvested in the central flyway are shot in Canada (white-fronts: 50-55%, Canada geese: 55-60%, Ross: 35%, and snows: 20-25%).

The opening date delay in the Goose Management Area has succeeded in increasing the Ross' goose population from 10,000 to 25-35,000 geese. The snow goose population has doubled in the last few years with 150,000 to 170,000 geese moving through Saskatchewan and Alberta. The increase is partially due to a low 30,000 harvest in the two provinces. All evidence then suggests that dark geese are harvested at a maximum while snow geese are underharvested.

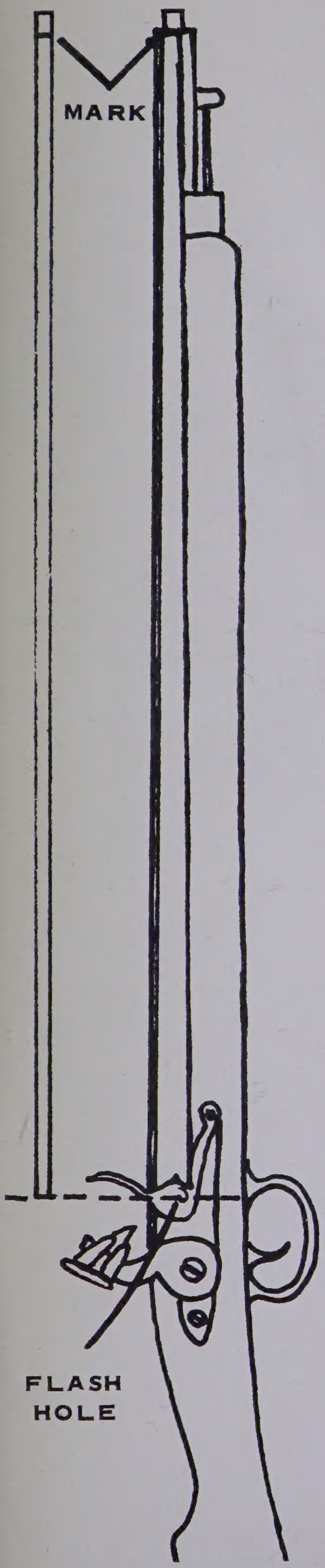
A variety of regulations have been considered to regulate the goose harvest. These regulations can be made for goose populations in the fall with knowledge of Arctic production, the adult population in the spring and the optimum breeding stock level for the following spring. Delaying the season opening has successfully protected the Ross' goose in the Goose Management Area and in 1968 allowed a larger proportion of white-fronts to migrate through Alberta before the season started.

Daily and seasonal or possession limits are perhaps more successful in reducing the goose harvest than the duck harvest as few hunters are obtaining a large proportion of the total goose harvest. On a daily basis approximately 30% of the parties of goose hunters are unsuccessful and another 30% only obtain one or two geese per day. A few hunters (20%) are killing a large proportion of the geese (65-70%). On a seasonal basis these few successful hunters, who are usually local hunters, may take much more than 70% of the harvest. A tag system for geese would disperse the goose kill among more hunters and has been successfully tried in Wisconsin and Wyoming. The protection of water for staging geese (¼ mile in Saskatchewan and ½ mile in Alberta) is worthwhile in dispersing more than in holding geese in an area.

Only a few long term studies have been carried out on the morning-only shooting regulation, but they have shown that there is often a drastic increase (up to 50%) in the goose harvest and especially with grey geese. In Saskatchewan, which partially manages the same population groups of geese as Alberta, the goose harvest has increased from 41,000 geese (prior to 1958 and the morning-only regulation) to 60,000 geese. The number of waterfowl hunters has remained a steady 50,000.

While the major argument for the morning-only regulations is to improve the quality of hunting, consideration has to be given to both people and goose management. There is little doubt that the ardent pit-hunter would have greater success with a morning-only regulation as the geese would be decoyed more readily if they were undisturbed the previous evening. This would eliminate other forms of hunting as the availability of fields remain fixed while the hunter population increases and the time for hunting is halved. Rather than provide recreation for the majority, the resulting increase in kill would still primarily be taken by a few hunters, would lower the recreational potential and would mean a subsequent decrease in bag limits and/or a delay in opening the season. More restrictive regulations still may not curb an overharvest and decline in our grey population as is occurring with white-fronts in Saskatchewan. At the same time, the more restrictive regulation may result in a decrease rather than allowable increase in the harvest of snows because of their erratic feeding habits.

The future of goose hunting may be more than partially up to the goose hunter and communities in east-central Alberta. To the hunter, goose hunting is a sport and to the local community it is an important source of revenue. Surely, if goose hunting is to be a sport, successfully decoying geese is more of a challenge than shooting until the last bird falls. Surely, if the local communities want to continue attracting tourist dollars they will also have to consider the hunter. There will have to be more opportunity for the non-local hunters to hunt and be successful and there will have to be less fleecing the "city hunter" on the one hand and accusations of unethical hunting on the other hand. The ethics of goose hunting may be resolved, but, there also has to be some opportunity of being successful to continue to attract hunters. A tag or punch-card system to restrict individual hunter success would not affect the majority of hunters or change present hunting procedures. However, it might lower the overall harvest and perhaps make land more available for the weekend or city hunter. But, that is only a hopeful prediction.



MUZZLE LOADER

THE TERM MUZZLE LOADER IS AN OBVIOUS ONE BECAUSE OF HOW THE GUN IS LOADED–THROUGH THE MUZZLE. POWDER IS POURED INTO THE BARREL AND A LEAD BALL OR BULLET IS PUT INTO THE BARREL ON TOP OF IT. A SMALL HOLE (FLASH HOLE) LOCATED AT THE CLOSED END, USUALLY AT THE SIDE, JUST ABOVE THE TRIGGER, ALLOWS A FLAME OR SPARK TO ENTER THE BARREL, IGNITE THE POWDER AND FIRE THE GUN. DEPENDING ON THE TYPE OF MUZZLE LOADER THE FLASH HOLE IS LOCATED ON THE BARREL IN DIFFERENT PLACES AND IN DIFFERENT WAYS BUT THE END RESULT IS THE SAME.

IT IS POSSIBLE FOR A MUZZLE LOADER TO HAVE BEEN LOADED MANY YEARS AGO, STORED IN DIFFERENT WAYS THROUGHOUT THE YEARS AND STILL BE LOADED AND DANGEROUS. ONE SIMPLE PROCEDURE WILL PROVE WHETHER OR NOT A MUZZLE LOADER IS LOADED. INSERT A WOODEN DOWEL WHICH IS LONGER THAN THE BARREL, INTO THE MUZZLE UNTIL IT WILL GO NO FURTHER. MARK THE DOWEL AT THE MUZZLE. REMOVE THE DOWEL AND POSITION IT ON THE OUTSIDE OF THE BARREL WITH THE MARK AT THE MUZZLE. THE DOWEL SHOULD REACH TO THE FLASH HOLE. IF IT DOES NOT, THE GUN MAY BE LOADED AND DANGEROUS––TAKE IT TO A GUNSMITH RIGHT AWAY. (THIS TECHNIQUE APPLIES TO MUZZLE LOADING HAND GUNS AS WELL)

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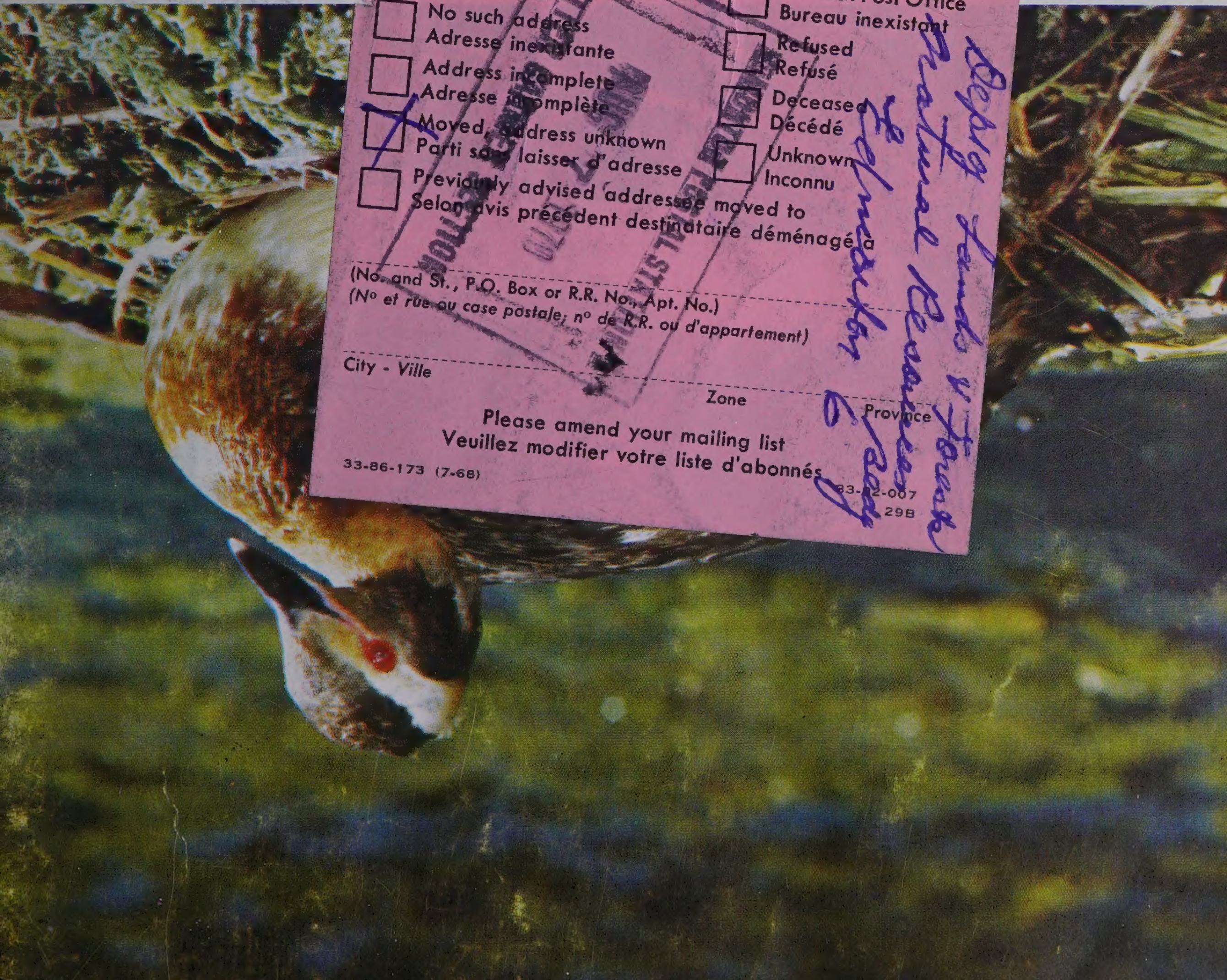

Horned

floating heap

VERNMENT PHOTOGRAPH

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